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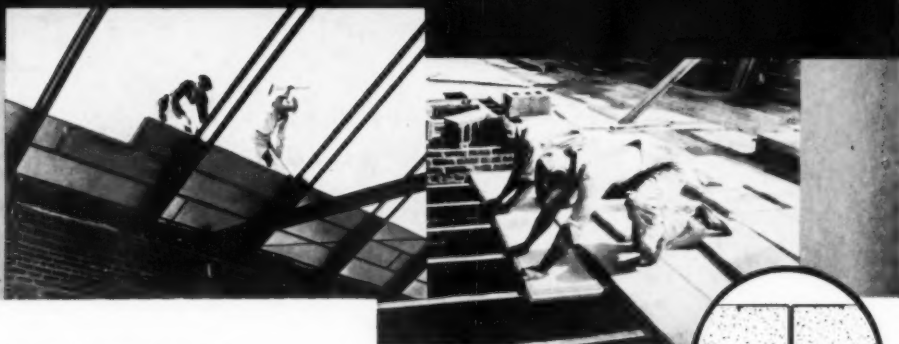
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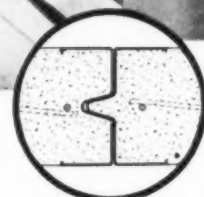
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THE ARCHITECTURAL RECORD

VOLUME 79 NUMBER 2 FEBRUARY, 1936

HOUSE OF ROBERT M. BROWN, CHESTNUT HILL, PHILADELPHIA, PA. Designed by Owner. Photograph by Albert Frey

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PORTFOLIO OF LOW-COST HOUSES:

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145-170

DWELLINGS FOR OWNER OCCUPANCY HOLD SPOTLIGHT. By L. Seth Schnitman, Chief Statistician, F. W. Dodge Corporation

39, 40 (adv.)

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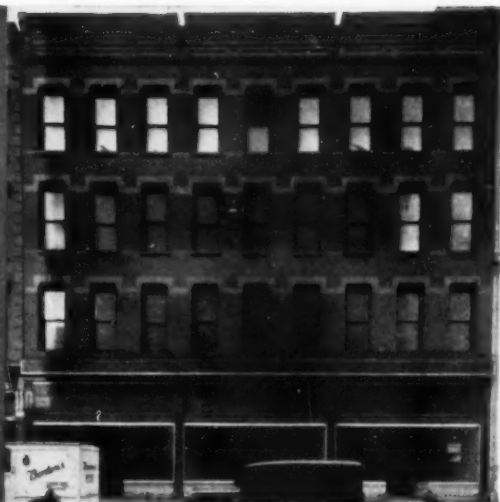
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A GOOD
"Face-Lifting"
MAKES!



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STUCCO IS
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CALENDAR OF EXHIBITIONS AND EVENTS

- February 18-29 Joint exhibition, Architectural League of New York with American Institute of Decorators—at Fine Arts Galleries, 215 West 57th Street, New York City.
- March 4 Symposium on High Strength Constructional Metals; regional meeting, American Society for Testing Materials—at Pittsburgh.
- March 9 Closing date of competitions for designs of firesafe concrete houses, sponsored by Portland Cement Association and conducted by Pencil Points. For details write Russell F. Whitehead, A.I.A., Professional Adviser, 330 West 42nd Street, New York City.
- April 1 Closing date for registration for Rotch Travelling Scholarship. For information, apply to C. H. Blackall, Secretary, 31 West Street, Boston, Mass.
- April 11 Closing date for preliminary drawings in Eighth Annual Bridge Design Competition of American Institute of Steel Construction. For information address Executive Offices of the American Institute of Steel Construction, 200 Madison Avenue, New York City.
- May 1 Closing date, Twelfth Annual Competition for Small Sculptures in White Soap. For information apply National Soap Sculptors Committee, 80 East 11th Street, New York City.
- May 5-8 Annual Convention of the American Institute of Architects at Williamsburg, Virginia.
- June 6 Opening, Texas Centennial Central Exposition in Dallas, Texas.

NEWS OF THE FIELD

The firm of Clark & Crowe, architects, has been dissolved by mutual consent as of January 1. The principals will continue their practice under their individual names as follows: Pendleton S. Clark, architect, 610 Krise Building, Lynchburg, Va., and Walter Rogers Crowe, architect, 609 Krise Building, Lynchburg, Va.

Mills, Rhines, Bellman & Nordhoff, Inc., architects, formerly of 1515 Ohio Bank Building, are now located at 301 Ricaby Building, 518 Jefferson Avenue, Toledo, Ohio.

Laurence J. Waller, structural engineer, announces his removal from 257 South Berendo Street to 601 South New Hampshire, Los Angeles, Calif.

J. R. Davidson, architect and designer, of the Medinah Club, 505 North Michigan Blvd., Chicago, Ill., should be addressed until further notice at Ojai, California.

Max A. Bernhardt announces the removal of his office from 721 Walnut Street, Philadelphia to 215 South Broad St., Philadelphia, where he will continue his own architectural practice and that of the late LeRoy B. Rothschild.

The Royal Institute of British Architects, 66 Portland Place, London, W.1, is forming a permanent collection of modern architecture and design. The collection—some six thousand photographs—will be housed in the Institute's library and will be available for reference and for touring exhibitions. The organizing of the material is entrusted to committees, each in charge of a section. Godfrey Samuel, of the section devoted to exhibition work (halls, pavilions, stands and the like), makes a special appeal to architects for photographs on the ground that work of this kind, being largely ephemeral, is not always illustrated in technical magazines and

MISS YEATMAN



Phillips Studio

is difficult to locate without cooperation from the designers.

Georgina Pope Yeatman, appointed Director of City Architecture in Philadelphia on January 6, is one of four registered women architects in Pennsylvania and the first woman member of Philadelphia's mayoralty cabinet. She is a bachelor of arts of the University of Pennsylvania and a bachelor of science in architecture of M. I. T., spent two years of study abroad, and has been connected with the office of Bissell & Sinkler, a partner of which firm, John P. Sinkler, she succeeds as Director of City Architecture. Miss Yeatman flies her own plane and as a member of Kappa Kappa Gamma Fraternity at the University of Pennsylvania organized the school's first women's polo team. Among her clubs are Women's City Club, Cosmopolitan Club, Art Alliance, Acorn Club, Pennsylvania Horticultural Society, Philadelphia Society for the Preservation of Landmarks, American Civic Association and Pennsylvania Museum of Art. As Director of City Architecture, Miss Yeatman will deal with housing, zoning, city planning and the like.

The American Institute of Steel Construction announces its eighth annual bridge design competition, open to registered students of structural engineering and architecture in technical schools of the United States and its possessions. A first prize of \$100 and a second prize of \$50, besides honorable mentions. Design subject: a steel highway bridge. Preliminary drawings on or before April 11. For information address Executive Offices of the American Institute of Steel Construction, 200 Madison Avenue, New York City.

Federation of Architects, Engineers, Chemists and Technicians, 119 East Eighteenth Street, New York City, offers five lectures for \$1 or 25 cents each at door:

The New City, Eugene Schoen, 8 P.M., March 20.

The A. F. of L. and Housing, Catherine Bauer, 8 P.M., March 29.

The Old Method and The New Technique, Clarence Stein, 8 P.M., April 3.

Why the Architect Must Be A Sociologist, Lewis Mumford, 9 P.M., April 10.

The Future of the Architect, Meyer Schapiro, 8 P.M., April 17.

The preliminary examinations for the 1936 Rotch Travelling Scholarship will be held April 13, the en loge sketches April 20 and 22, and the sketch for the finals April 25. Applicants are expected to register on or before April 1. For registration and further information apply to C. H. Blackall, Secretary, 31 West Street, Boston, Mass.

THE ARCHITECTURAL RECORD

VOLUME 79 NUMBER 2 FEBRUARY 1936

MARCH ISSUE

SPECIAL BUILDING TYPES, including:

- A Railroad Station by Edgar I. Williams, architect.
- A Resort Hotel by William Lescaze, architect.
- A Book Shop designed by Morris Lapidus.
- A Remodeled Café by Otto Teegen, architect.
- A Bathing Establishment by Moestue and Schistad.
- A Service Station by L. Raymond White, architect.

ASSOCIATES

JAMES M. FITCH, JR., has joined the editorial staff of The Architectural Record. He studied architecture at the University of Alabama and at Tulane University. Following special studies under the direction of Henry Wright, architect and city planner, he engaged in housing research and regional planning. He was formerly with the Nashville Planning Commission and later Director of Population Statistics, Tennessee State Planning Commission, and finally was with the Low-Cost Housing Division of the Federal Housing Administration.

GENE HAWLEY has been placed in charge of format. He was graduated from the College of Fine Arts, Syracuse University, where he won a Fellowship for a year's study in Paris. Before joining The Architectural Record he was engaged in the preparation of displays and exhibits for the Colonial National Monument Museum at Yorktown, Virginia.



Photograph by Albert Frey

This issue is devoted to the low-cost private house. The topic has been chosen in recognition of the growing practical interest of architects in the problem of designing a livable house with modern mechanical equipment that can be built for \$4,000 or less. Study of the problem may be facilitated by considering (1) architectural standards, (2) mechanical equipment, (3) placing mechanical equipment with a view to economy in plan and construction and (4) construction materials and methods appropriate to the expected economic life of the building.

THE LOW-COST HOUSE

COST RANGE

This has been fixed at \$4,000 to \$2,400 for the following reasons:

1. The upper limit has been placed at \$4,000 on the ground that, taking the country as a whole, many architects, especially in the smaller urban places, have had experience in designing private dwellings above that limit.

2. The lower limit has been placed at \$2,400 on the ground that urban families with a yearly income of \$1,500 can afford a house of that value but that urban families with incomes of less than \$1,500 are at subsistence or poverty levels and must rent homes. It is for the upper brackets of the income groups below \$1,500 that the Federal government is promoting the construction of low-rent housing. "The Housing Division was set up as a self-contained unit in the Public Works Administration to make a study and demonstration of decent housing for low income urban workers. If you will grant that by and large no such worker with an income of less than \$1,500 per year has a sufficient margin of economic security to justify home ownership, you will find that nearly half of all urban families should always remain on a rental basis." (A. R. Clas, Director of Housing Division, in National Radio Forum, Nov. 18, 1935.)

Accepting the assumptions of the reorganized home mortgage market that the cost of a home should not exceed two times the family's annual income and that the family should put in an owned equity of 20 per cent, the building or buying of homes is restricted to families with incomes of \$1,500 or more, because with less income savings are too meager. (*America's Capacity to Consume*, by Maurice Leven, Harold G. Moulton, and Clark Warburton. The Brookings Institution, Washington, D. C., 1934, p. 261.)

The price which a family can afford to pay for a home depends upon many factors besides income; for example, the number of children and other dependents, financial obligations other than the mortgage, and so on. The Federal Housing Administration, therefore, in considering applications for mortgage insurance insists upon no fixed ratio between value of home and income except that the value must not exceed four times the annual income. The general rule that the value should not exceed two times the annual income was formulated by the President's Conference on Home Building and Home Ownership on the basis of experience and practice in the mortgage market.

The normal relationship between the cost of the lot and the cost of the house is 20 per cent for the lot and 80 per cent for the house.

On the foregoing premises the following table is based:

Income	Lot	House	Total
\$2,500	\$1,000	\$4,000	\$5,000
2,000	800	3,200	4,000
1,500	600	2,400	3,000

A house at \$2,400 is out of the question in large urban places with building codes adapted to closely spaced buildings on narrow lots. However, the census defines an urban place as one with a population of 2,500 or more. In the majority of villages and small towns conventional frame construction is not only permitted but justified by generous spacing on wide lots.

SIZE

As the average number of persons per family in the 1930 census was a fraction over four, it would seem that the typical house set up for study should have three bedrooms, to insure privacy for children of different sex. It is true that plenty of families have couch beds in the living room, but the very fact that so large a proportion of existing low-cost homes are sub-standard in privacy as in other qualities makes an architectural study desirable not only for professional advantage but for social service.

Whether the low-cost house may have a living room and a dining room or must be content with a living-dining room is one of the questions which the study should answer.

A kitchen with laundry extension or with separate laundry and a bathroom are essential, while cellar and attic are warranted only if their utility is worth the cost. A garage is essential, because the low-cost home is normally at a distance from low-fare rapid transit; but it may or may not be economical to combine it with the house.

The low-cost house, according to approved architectural standards with generous room dimensions, would probably have a volume of 10,000 cubic feet, not including garage.

The objectives of the study should be to answer these questions: Is it possible to design a single house in conformity with good architectural practice at the costs suggested, using products now on the market? If not, is it possible to do so in large-scale projects? The results of the study should reveal to architects whether there is a chance for professional service in the low-cost house field and to manufacturers whether through volume fabrication products heretofore restricted to moderate-cost dwellings can be adapted to low-cost houses. The contents of this issue have been brought together and organized to promote such a study by architects and manufacturers.

CONSTRUCTION COST VARIES WITH LOCALITY

Prices in this issue are given merely to indicate that the products mentioned are available to the low-cost house designer. Unless otherwise stated, they apply to the New York retail market. The products are of standard size and quality, not seconds.

Prices, wages and transportation and financing costs differ with the locality, making comparative construction cost studies difficult. The difficulty is increased by the fact that construction and mechanical equipment differ with conditions of climate and natural hazards (tornadoes, earthquakes, termites and the like). However, the problem of comparing construction costs will be simplified by index numbers for some 70 cities which began to appear in the Federal Home Loan Bank Review for January.

The index numbers are based on an identical house, a detached house of 24,000 cubic feet volume of sound design and workmanship, containing living room, dining room, lavatory and kitchen on the first floor, three bedrooms and bath on the second floor, an attic and a cellar. The exterior is of wide-board siding with brick and stucco trim. A one-car, attached garage is included. The design meets the requirements of the average municipal building code.

The basic data consists of prevailing unit prices of materials and labor, compiled by the personnel of the Reconditioning Division of the Home Owners' Loan Corporation, which includes architects and builders familiar with local construction practices. Items for overhead expense and contractor's profit are added, but not home mortgage financing costs.

The same home that can be erected in Columbia, S. C., for \$4,337 costs \$6,442 in Providence, R. I. It can be constructed in Baltimore for \$5,028, but costs \$6,033 in Cumberland, Md., 125 miles away. In Chicago, it costs \$6,361, in Hartford, Conn., \$5,846, in Oklahoma City \$5,756, in Pensacola \$5,095 and in Colorado Springs \$5,972.

The house represented by the Federal Home Loan Bank Review's index numbers is undoubtedly typical of current construction. According to the Dodge Statistical Research Service, the average contract award for 23,425 single-family dwellings placed under construction for owners' occupancy during the first ten months of 1935 in 37 Eastern States was \$6,362.

This average suggests that houses costing considerably less must have been fairly common. It is generally understood that, speaking for the country as a whole, many architects have experience in designing houses costing \$4,000 or more. At any rate, this figure may be arbitrarily accepted as the dividing line between moderate-cost houses and low-cost houses, with the further assumption that examples of good architectural practice are rare with regard to the latter.

ARCHITECTURAL STANDARDS

Uniform architectural standards are needed as a starting point for comparable cost studies. The most comprehensive architectural standards of general validity are those incorporated in the Underwriting Manual of the Federal Housing Administration. The Manual is in the form of risk rating instructions to appraisers who report on applications for mutual mortgage insurance.

This insurance is restricted to mortgages on residential property appraised at not more than \$20,000. A mortgage eligible for insurance may cover 80 per cent of the appraised valuation, may run for 20 years, and must be amortized by monthly payments. The insurable amortizing single mortgage stands for safety and liquidity to the lending institution and for a low financing cost with definite monthly obligations to the borrower. Thrift institutions are therefore lending money for construction of new dwellings on this type of mortgage security, protected by the Federal Housing Administration through its appraisals, construction inspections and mutual mortgage insurance.

As the amortizing mortgage is the dominant lending instrument of the reorganized home mortgage market, and as the conditions upon which insurance is granted are set forth in the Underwriting Manual, familiarity with the contents of the Manual is prerequisite to practical cost studies in small house architecture.

The architectural standards incorporated in the Manual are expressed in terms of quality and consequently require interpretation. For example, the Manual demands "an economical layout" and goes on to say: "An economical layout is one which presents the greatest proportion of usable area in relation to gross floor area. An excess of unusable space makes a house undesirable. Aside from the added cost of construction and maintenance, it adds to the cost of furnishing and to the labor of sweeping and cleaning."

Interpretation of this standard—economy of layout—rests with the Federal Housing Administration. The designer of a moderate-cost house knows from experience what room dimensions and plan arrangement will be accepted, because the Federal Housing Administration in connection with any particular mortgage insurance application demands neither more nor less than good architectural practice.

However, the low-cost house is new to architectural practice. The designer is obliged to evolve minimum room dimensions by analysis of the uses of rooms and their furniture. As a guide to what the Federal Housing Administration is likely to accept he will be helped by precedents established by other government agencies—the Housing Division of the Public Works Administration, the Tennessee Valley Authority and the like. Economical layout is therefore illustrated in this issue by citing room dimensions and giving examples of floor arrangements used by government construction agencies or recommended by research.

This procedure is followed with respect to all architectural standards.

NEIGHBORHOOD STANDARDS

In the past there has been no encouragement for architects to study either the low-cost house or subdivisions appropriate to low-cost houses. However, the agencies through which the home mortgage market has been reorganized insist upon quality in the neighborhood as well as in the house—the Federal Home Loan Bank System in connection with discounting of mortgages and the Federal Housing Administration in connection with mortgage insurance. The house and the neighborhood are each a constituent part of a larger problem—the low-cost home, which can be achieved only in a neighborhood where public improvements, utilities and services are planned as economically as is the house. Besides, the cost of homes is greatly re-

duced by large-scale projects, beginning with the subdivision of acreage and ending with the building of a dozen or more houses at a time. House design and subdivision design logically belong together in architectural practice, especially as related to low-cost homes. The fact that the reorganized home mortgage market demands technically informed treatment in (or a studied cost relationship between) both kinds of design offers new possibilities for the architectural profession.

The neighborhood standards incorporated in the Underwriting Manual are clarified as to detail in a series of articles, entitled *Neighborhood Standards As They Affect Investment Risk*, in the *Federal Home Loan Bank Review*. The fifth article (December 1935), following the lead of Clarence Perry in the *Regional Survey of New York and Its Environs* (Vol. 7, Monograph 1), says in substance: "New neighborhoods may be protected from decay and run-down districts may be measurably restored through a gradual subdivision of our cities into neighborhood units, largely self-contained. Through traffic arteries automatically constitute the boundaries of such units, since freedom from traffic hazards is essential to successful development of a home area.

"The size of the neighborhood area is determined chiefly by the population necessary to support an elementary school, usually 2,000 to 6,000, and by the proximity of the school. Its radius may vary from $\frac{1}{4}$ to $\frac{1}{2}$ of a mile, depending on the distance from the center of the city, the one mile square dimension being feasible in the suburbs. Shopping districts along the boundary streets would thus be within convenient walking distance from any part of the area.

"Another requirement of the neighborhood is that it possess an identity of its own in which the occupants may take pride. Voluntary neighborhood associations, organized to improve the public services and to prevent undesirable encroachments, rarely develop in areas occupied by more than 5,000 people.

"An area measuring from one-half to one mile on a side, depending on its location, is ideal for a community of medium cost, single-family homes because it encourages efficient neighborhood services, traffic safety and neighborhood character."

The Federal Housing Administration favors a lower maximum of lot coverage than is frequently permitted by local ordinances. A major point in its housing policy is that ample light and air in all inhabited rooms is essential. It indorses the trend in modern housing development towards lower land coverage. Provisions for light and air that are inadequate according to enlightened practice are increasingly a factor in obsolescence and will give a mortgage a low rating as an insurance risk. A desirable maximum coverage for single family detached homes, including all accessory buildings, is 20 per cent of the lot. (Circular No. 2, Property Standards, Federal Housing Administration. p. 7.)

PLANNING AND ACCOMMODATION

The Federal Housing Administration permits fewer rooms and less mechanical equipment than are suggested for the three-bedroom house set up for study in this issue, but does so only where the smaller requirements conform to the character of the neighborhood. For example, the minimum accommodation for a dwelling is three rooms and a bathroom. However, such a dwelling would probably not be accepted for mortgage insurance if located in a neighborhood of typical six-room houses. In any event, the study is intended not to illustrate minimum

standards under special conditions, but good architectural practice under typical conditions.

MECHANICAL EQUIPMENT

This includes plumbing and sewerage, heating system and electric light and power. In the absence of precedent from good architectural practice with respect to the low-cost house, it is necessary to determine (1) what equipment is essential to health and utility, (2) what appliances for comfort and recreation are customary in low-income families and (3) what low-price equipment and appliances are available on the market.

Effort has been made to present in the following pages information on each of these three points as complete and useful as possible. The position has been taken that mechanical equipment must be adequate and of good quality, to withstand undue obsolescence during the life of a 20-year mortgage, and also to avoid heavy repair costs and frequent damage.

Quite a few manufacturers are producing equipment and appliances suited to the low-cost house, although heretofore sold mainly in the modernization market. The prices cited are those which an architect can obtain for a client building a single house. The impression received is that the low-cost house designer has a wider choice of mechanical equipment than might have been expected without investigation.

It is, for example, something of a surprise to learn from the special study for this issue by Henry L. Logan, consulting electrical engineer, that a light and power system conforming to the fire underwriters' code, with outlets of sufficient number and so located as to provide proper intensity and distribution of light, with adequate convenience outlets located in relation to furniture layout, with wiring of proper gauge, with sufficient number of circuits, with knife switches, cabinets and wall switches of substantial construction can be installed for as little as \$80 without fixtures and \$122 with fixtures.

The placing of mechanical equipment with a view to economy in plan and construction is of special importance in small house design and pains have been taken to find or to originate illustrative examples.

CONSTRUCTION MATERIALS AND METHODS

Mechanical equipment represents so large a part of the total cost of the modern house that consideration must be given to the relationship between the probable useful life of the structural shell and the probable useful life of the equipment. If, for example, the fixed mechanical equipment depreciates at a rate of 4 to 5 per cent a year, more durable materials for the shell are not economical except where needed to achieve a satisfactory degree of resistance to use, weather, fire, decay and, in some neighborhoods, tornadoes or earthquakes.

A wood frame house of traditional construction is no doubt still the least expensive in first cost, but maintenance is high. Such a house is possibly not as economical over twenty or twenty-five years as one of fabricated units, including concrete blocks, moisture-proof plywood, fireproof roofing, and so on.

Useful depreciation tables covering mechanical equipment, and the traditional types of house construction have been compiled by the Bureau of Internal Revenue for use with income tax returns.

TABLE 1

MEDIAN VALUE OR RENTAL OF NONFARM HOMES FOR THE UNITED STATES, 1930

MEDIAN VALUE OF OWNED NONFARM HOMES		MEDIAN RENTAL OF RENTED NONFARM HOMES	
Total	\$4,778	Total	\$27.15
Urban	5,743	Urban	32.06
Rural Nonfarm	2,661	Rural Nonfarm	12.01

TABLE 2

DWELLINGS, BY CLASS OF DWELLING, FOR THE UNITED STATES, 1930

CLASS	NUMBER	PER CENT
Total	25,204,976	100.0
One-family dwellings	22,833,110	90.6
Two-family dwellings	1,728,087	6.9
Three-or-more-family dwellings	643,779	2.6
Urban	13,046,699	100.0
One-family dwellings	11,001,861	84.3
Two-family dwellings	1,430,570	11.0
Three-or-more-family dwellings	614,268	4.7
Rural	12,158,277	100.0
One-family dwellings	11,831,249	97.3
Two-family dwellings	297,517	2.4
Three-or-more-family dwellings	29,511	0.2

TABLE 3

TENURE OF HOMES FOR THE UNITED STATES, 1930

(Private-family homes, not including premises having quasi-family groups)

TENURE	NUMBER	PER CENT
All homes	29,904,663	100.0
Owned	14,002,074	46.8
Rented	15,319,817	51.2
Tenure unknown	582,772	1.9
Farm homes	6,668,681	100.0
Owned	3,498,688	52.5
Rented	2,968,268	44.5
Tenure unknown	201,725	3.0
Nonfarm homes	23,235,982	100.0
Owned	10,503,386	45.2
Rented	12,351,549	53.2
Tenure unknown	381,047	1.6

TABLE 5

NUMBER OF CITIES HAVING AVERAGE INCOMES IN DESIGNATED GROUPS, 1929 AND 1933

INCOME GROUPS	HOME-OWNERS		TENANTS	
	Number of Cities	Number of Cities	Number of Cities	Number of Cities
	1929	1933	1929	1933
\$500 - \$749	..	3	2	3
\$750 - \$999	..	25	20	17
\$1,000 - \$1,499	..	25	20	32
\$1,500 and over	52	24	30	..

THE MARKET FOR LOW-COST HOUSES

Families with incomes of \$1,500 to \$2,500 constitute a large market for houses as well as for food, clothing and other necessities. The authors of *America's Capacity to Consume* estimate that there were in the 1930 census 21,674,000 nonfarm families of two or more persons, of which 6,905,000 or 31 per cent had (in 1929) incomes of \$1,500 to \$2,500.

That low-cost homes are numerically important may be inferred from the fact that 54 per cent of the 10,503,386 owned

nonfarm homes (house and lot) enumerated in the 1930 census were valued at less than \$5,000. The number valued at \$3,000 to \$4,999 was 2,343,769 or 22 per cent of the total.

Owned nonfarm homes included 7,385,968 urban and 3,117,418 rural nonfarm homes. As defined by the Census Bureau, the urban population is in general that residing in cities and other incorporated places having 2,500 inhabitants or more, while the rural nonfarm population is made up of persons living in villages having fewer than 2,500 inhabitants or in the open country but not on farms.

The three census tables at the top of this page confirm the importance of the low-cost home.

TABLE 4

AVERAGE FAMILY INCOME
HOME-OWNERS AND TENANTS

AREA AND NUMBER OF CITIES	HOME-OWNERS			TENANTS		
	Yearly ¹ average income	Decline from 1929		Yearly ¹ average income	Decline from 1929	
	1929	1933	Per Cent	1929	1933	Per Cent
Average—52 Cities	2,269	1,478	35	1,512	1,052	30
New England—4 Cities	2,746	1,857	32	1,701	1,217	28
Middle Atlantic—4 Cities	2,183	1,445	34	1,556	1,079	31
East North Central—6 Cities	2,251	1,291	43	1,657	1,027	38
West North Central—10 Cities	2,152	1,436	33	1,580	1,132	28
South Atlantic—9 Cities	2,275	1,619	29	1,218	924	24
East South Central—3 Cities	2,212	1,351	39	1,218	783	36
West South Central—6 Cities	2,444	1,591	35	1,543	1,091	29
Mountain—6 Cities	2,142	1,300	39	1,561	1,045	33
Pacific—4 Cities	2,157	1,395	35	1,648	1,142	31

¹ An arithmetic average of the averages for individual cities has been used to minimize the effect of variations in size of sample.

TABLE 6

PERCENTAGE DISTRIBUTION OF HOME-OWNERS' FAMILY INCOME BY INCOME GROUPS AND GEOGRAPHIC AREAS

AREA AND NUMBER OF CITIES	Total Per Cent	Under \$500	INCOME GROUPS —			HOME-OWNERS	
			\$500 to \$999	\$1,000 to \$1,499	\$1,500 to \$1,999	\$2,000 to \$2,999	\$3,000 and Over
61 Cities	100	25.0	21.5	17.7	14.1	12.3	9.4
New England—6 Cities	100	18.8	19.2	19.4	14.7	15.0	12.9
Middle Atlantic—5 Cities	100	28.2	24.3	18.5	11.8	10.0	7.2
East North Central—7 Cities	100	28.7	22.7	16.8	12.4	10.8	8.6
West North Central—10 Cities	100	21.0	22.4	19.5	15.5	12.8	8.8
South Atlantic—10 Cities	100	22.3	19.4	16.8	13.5	14.4	12.6
East South Central—4 Cities	100	31.9	19.7	15.9	13.7	11.3	7.5
West South Central—7 Cities	100	22.3	19.3	16.3	15.0	14.5	12.6
Mountain—8 Cities	100	27.2	21.4	17.1	14.3	11.6	8.4
Pacific—4 Cities	100	24.7	21.2	18.2	15.8	12.4	7.7

TABLE 7

PERCENTAGE DISTRIBUTION OF TENANTS' FAMILY INCOME BY INCOME GROUPS AND GEOGRAPHIC AREAS

AREA AND NUMBER OF CITIES	Total Per Cent	Under \$500	INCOME GROUPS —			TENANTS	
			\$500 to \$999	\$1,000 to \$1,499	\$1,500 to \$1,999	\$2,000 to \$2,999	\$3,000 and Over
61 Cities	100	30.8	25.4	18.4	12.4	8.6	4.4
New England—6 Cities	100	21.1	27.3	23.0	14.2	9.3	5.1
Middle Atlantic—5 Cities	100	31.5	27.6	18.6	11.4	7.5	4.4
East North Central—7 Cities	100	29.8	25.3	18.6	12.1	8.9	5.3
West North Central—10 Cities	100	23.4	27.2	21.2	14.1	9.7	4.4
South Atlantic—10 Cities	100	40.1	24.5	13.9	9.8	7.8	3.9
East South Central—4 Cities	100	49.7	21.2	12.6	8.6	5.4	2.5
West South Central—7 Cities	100	29.4	24.0	19.5	13.1	9.6	4.4
Mountain—8 Cities	100	30.6	24.5	18.1	13.3	8.9	4.6
Pacific—4 Cities	100	25.8	26.2	20.3	15.0	8.8	3.9

OWNED CITY HOMES AND FAMILY INCOMES

A valuable study of a group of 789 home-owning families in Buffalo, N. Y. (population, 573,076), was conducted in 1930 for the Committee on Relationship of Income and The Home under the direction of Prof. Martin A. Brumbaugh of the University of Buffalo, with the technical assistance of Mr. William M. Haenzel (Publications of The President's Conference on Home Building and Home Ownership, Vol. IV, pp. 76—134). The families were selected on the following

conditions: 1. Total income not exceeding \$3,000 in 1930, 2. Family composed of husband and wife and at least one dependent child, 3. Both parents born in the United States, 4. Ownership of home, and still in process of paying for it in 1930, 5. Not more than two roomers or boarders, 6. Living in a one- or two-family dwelling, 7. No doubling up with one or more other families in quarters intended for one family.

Eighty-two per cent of the 789 houses were single-family dwellings. All except three were of frame. The majority were bought after 1922, the average purchase price being \$6,131 for single houses (with lots) and \$8,530 for two-family houses. The average earnings of the principal breadwinner at the time

of purchase, excluding nine unknown cases, amounted to \$2,057, which in 1930 had fallen to \$1,902.

AVERAGE FAMILY INCOME OF HOME-OWNERS AND TENANTS

Tables 4, 5, 6, and 7 were compiled by the Financial Survey of Urban Housing, a CWA project conducted in 1934 by David L. Wickens, under the auspices of the Bureau of Foreign and Domestic Commerce. The survey obtained information in 61 cities, representing every State and covering on a sampling basis all parts of each city and all types of dwelling. The final report, entitled Financial Survey of Urban Housing, now at the Government Printing Office, provides information on urban residential values, mortgage debt, arrearages, family incomes and other aspects of the housing problem.

For 1929 all 52 cities in Table 4 had average owner incomes over \$1,500 and 30 had average tenant incomes over \$1,500. In 1933 only 24 cities reported owner-incomes over \$1,500 and no city reported average tenant income equal to that amount.

Incomes under \$500 were more numerous in 1933 than for any other group of equal range. The incomes between \$500 and \$1,000 were almost equal in number to those less than \$500 while those between \$1,000 and \$1,500 numbered more than for any other group over \$1,000.

Incomes below \$500 were about one-half of the tenant cases and one-third of owner incomes in four East South Central cities. They constituted from 32 to 43 per cent of all owner incomes in 12 cities and from 33 to 60 per cent of the tenant incomes in 22 cities. Owners of homes in all areas have a generally higher level of incomes than those renting their housing accommodation.

SUBSTANDARD DWELLINGS PREVALENT

That a large proportion of owned homes are inferior in quality is proved by many federal, state, city and private housing reports and property inventories. The best recent factual

study of substandard dwellings of all kinds is Edith Elmer Wood's *Slums and Blighted Areas in the United States* (Housing Division Bulletin No. 1, Government Printing Office, Washington, D. C., 1935).

It is probably safe to say that the majority of existing low-cost private dwellings were inferior as to essential qualities of plan, construction and equipment when they were built. The prevalence of substandard low-cost dwellings is undoubtedly due more to original deficiencies than to obsolescence. Deficiencies in the house were in a way inevitable, because so small a part of the cost of the home was available for the house under former financing and lot costs.

The cost of the home is conditioned by (1) the cost of mortgage financing, (2) the cost of the lot and (3) the cost of the house.

Financing consisted generally of a first mortgage and a second mortgage. The first mortgage was for a short term, say three years, and usually cost, with renewal charges, more than 6 per cent a year. Junior mortgages frequently cost, with bonuses, 18 to 20 per cent. (Publications of The President's Conference on Home Building and Home Ownership, Vol. II, Home Finance and Taxation, p. 9.)

Lot prices were inflated for a variety of reasons, one of which was that subdivisions were rarely, if ever, planned consistently for a low-income population and low-cost private dwellings. The price of land adjusts itself to the type of use and for the first time in America the Federal Housing Administration assures a correlation between subdivision development and housing improvement. The best recent survey of modern principles of community plan and house design is a paper entitled "The Inter-relation of Site Plan and Types of Units," by William Stanley Parker, in *The Octagon* for November 1935.

The reorganization of the home mortgage market through the Federal Home Loan Bank system and the Federal Housing Administration has completely changed the situation for architects and manufacturers as well as for home buyers with respect to low-cost private dwellings. Not only has a substantial sum been liberated for use on the house by reduced financing costs and deflated lot prices, but the Federal Housing Administration in effect insists that this sum be put into improved plan, construction and equipment before insuring mortgages.

TABLE 8

NEW SINGLE-FAMILY DWELLINGS FOR OWNERS' OCCUPANCY
CONTRACTS LET DURING DECEMBER 1935, IN 37 EASTERN STATES
DODGE STATISTICAL RESEARCH SERVICE

	TOTAL		PLANNED BY ARCHITECTS		PER CENT OF DOLLAR VALUE BY ARCHITECTS
	No.	Value	No.	Value	
Under \$3,000 . . .	136	\$278,700	8	\$17,500	6.28%
\$3,000 - \$3,999 . . .	217	708,900	37	123,300	17.39%
\$4,000 - \$4,999 . . .	276	1,162,200	55	231,700	19.94%
\$5,000 - \$7,499 . . .	536	3,126,500	199	1,170,800	37.45%
\$7,500 - \$9,999 . . .	221	1,827,900	117	973,900	53.28%
\$10,000 - \$12,499 . . .	157	1,683,700	109	1,170,700	69.53%
\$12,500 - \$14,999 . . .	27	363,800	18	244,000	67.07%
\$15,000 and over . . .	131	3,180,500	108	2,654,500	83.46%
TOTAL	1,701	\$12,332,200	651	\$6,586,400	53.41%

STANDARDS FOR THE LOW-COST HOUSE

HOUSE REQUIRED FOR LOW-INCOME GROUP

The house considered in this study is a freestanding one-family house, for a site of which only 20 per cent is to be covered by the house and any subsidiary buildings and which is to be located in a planned community, protected by zoning and other legal restrictions.

Size of House. The most important measure of a dwelling is the amount of accommodation. The size of the house here discussed is determined by the floor area required for health and comfort by the typical American family composed of two adults and two children. It is not a house of minimal room sizes. Reasonable spaciousness is provided.

Accommodation consists of: three bedrooms, a combined living-dining room, a bathroom, a kitchen, closets, cabinets and other storage space, a stair hall if house is of two stories and either a utility room or a cellar. As a garage can be built separately, it has not been included in our study.

Cubic Contents. In measuring a dwelling by the amount of accommodation it has been customary, but not entirely exact, to compare costs and to determine costs on the basis of cubic contents. It is clear, however, that houses having the same accommodation may vary greatly in cubic contents, depending on roof, porches, height of rooms, and whether or not a utility room takes the place of a cellar or basement.

When the sizes of rooms are reduced below what is convenient, the saving is comparatively small, while the injury to the plan and value of the dwelling may be great.

"In some localities an increase of 10% in the superficial area only increases the cost by 5%. Economy is therefore best secured where value is proportionate to accommodation and accommodation is proportionate to needs of those who use houses, remembering always that in every house a certain minimum of equipment is common to all, whatever the area of the house may be."*

Ten thousand cubic feet contents are assumed as providing the reasonable accommodation within the definition and purpose of this study.

Ceiling Height. A ceiling height of 8'-0" is recommended. This conforms to most building codes where specific floor to ceiling dimensions are specified. Ceiling heights as low as 7'-6" have been approved by the Federal Housing Administration but this height is not considered best practice. In all cases windows are placed with head near ceiling so as to permit best natural daylighting and ventilation.

Cost of House. It is believed that the cost of a constructed house of this defined size and accommodation is capable of sensible reductions by means at the command of architects. Savings will be achieved by elimination of waste space through skillful planning technique and by studied selection and purchase of materials and equipment.

The building of dwellings within our cost limits is, in fact, by no means uncommon at the present time. Examples of houses built within the United States during the past two years with a verified cost of less than \$4,000 are published as a part of this issue.

*International Housing Conference, Paris. p. 119.

Character of the House

STANDARD OF LIVING

The fact that the house set up for study is termed a low-cost house does not imply any cheapening by shoddy or unsafe construction, undue reduction of needed room sizes, or elimination of equipment to the extent of discomfort or inconvenience. On the contrary, consensus upon standards superior to ordinary practice is one of the objectives of the study. Higher standards, for example, are looked for under the following headings:

Sanitation.

Quality and convenience of accommodation.

Closer approach of heating to requirements of health and comfort.

Adjustment of daylighting and artificial illumination to needs.

Interior and exterior finishes (surfaces requiring little or no upkeep, greater simplification).

Sound and heat insulation.

Termite and other vermin prevention.

Construction (rapidity of erection, fire safety). Analysis of the functions of the house, as well as improvement in building materials and equipment, demands an adjustment of planning and building technique—elevated to the level of current social and economic needs.*

Character of the House. The house should be more flexible than it has been in the past and an altogether more unconventional type of house planning must be evolved. Safety of investment will be better insured by the house that permits easy alteration and addition of new or improved equipment. The ideal would be to obtain the utmost in usable internal space by elimination of waste or excess size. The dual use of rooms can, in some instances, lead to economy of house cubage. For the lowest cost house it is deemed reasonable to combine living and dining areas.

Internal partitions may be of light but soundproof material which could be easily moved in case of alteration of size or use of rooms. This kind of planning and building would be favored by some "unit system" or "framed" method of construction.

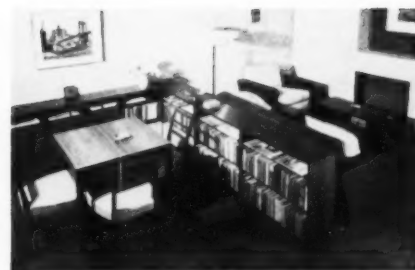
Planning of the house should definitely follow the requirements for healthful and pleasant living. Convenience of arrangement should be accepted as an aim in planning.

The basic design of a house resolves itself into a study of (1) required areas and (2) needed furniture and equipment. Both of these items should be studied in advance of drawing plans.

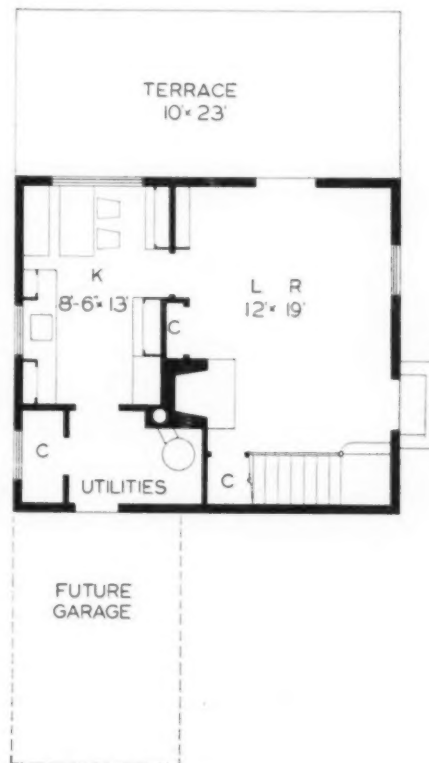
For both economy and successful "working of a house" the exterior design should follow the determined plan. This means an exterior which would be simple in outline but varied in the relation of the house to its plot. The designer would find opportunities for expanding the living room on to a paved garden terrace. Sun balconies would be featured and there would be wide window spaces.

The function of walls for dwellings, as for other buildings, is changing with new construction technique. Walls are no longer the sole element of support as in a solid brick wall. The new space-saving construction transfers the supported loads to a concrete framework or to light steel columns. With this construction walls become

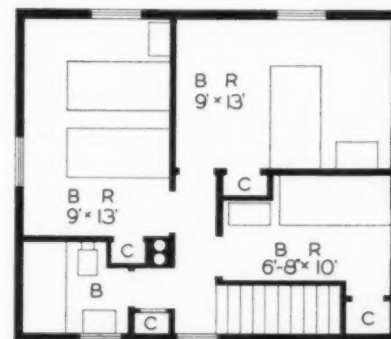
*Minimum desirable standards for living as they influence house design can be regarded as the least that should be provided but, by no means, as the limit of what should be provided. Mrs. Edith Elmer Wood has defined housing standards for multi-family dwellings as follows: "Housing is substandard if each family is not provided with an ample and pure supply of running water, with an indoor flush toilet for its exclusive use, with a bathtub or shower, and if, in a built-up community, it is not connected with the sewer system. The small and middle-size towns, as well as the large ones, are very backward in this respect." From *Slums and Blighted Areas in the United States*. Housing Division Bulletin, No. 1, p. 6, 1935.



COMBINED LIVING AND DINING ROOM arranged with a furniture separation of the two functions of room. Furniture by Gilbert Rohde.



ECONOMICAL PLAN for low-cost house by Frank J. Forster, architect. Plan of square shape, dining alcove in kitchen, and dining space in living room, kitchen combined with utility room. Exterior walls 8" cinder block and double core furring. Floor framing, pre-cast concrete joists and cinder slab filling with wood floor finish. Total cubage, 8,705 cubic feet.



SECOND FLOOR PLAN. Bedroom of adequate size having cross-ventilation and ample storage space.

Planning Economies

screens to keep out rain, cold, and noise. Walls also (as screens) serve as sources of light, controlled at will of occupant.

"Systematic technical improvement in steel and concrete, and nicer and nicer calculations of their tensile and compressive strengths are steadily reducing the area occupied by supporting members. This, in turn, naturally leads to a progressively bolder (i. e., wider) opening up of the wall surfaces, which allows rooms to be much better lit. It is therefore only logical that the old type window—a hole that had to be hollowed out of the full thickness of a supporting wall—should be giving place more and more to the continuous horizontal casement, subdivided by their steel mullions, characteristic of the new architecture. And as a direct result of the growing preponderance of voids over solids, glass is assuming an even greater structural importance."*

The house of square or almost square shape is more economical to construct than one of L or other rambling type. This applies particularly to a wood-framed house. A house of square shape requires less foundation, less walls and insulation and is cheaper to heat.

The house of five or more rooms is more economical when rooms are arranged on two floor levels.

The house of prefabricated units, on the other hand, has been found by experience to be less costly to erect as a one-story house. There is simplification of bracing, fewer connections, less hoisting, no stairway.

The two-story house reduces land coverage, leaving more space for gardening, for outdoor extension of the functions of the living room and for outdoor play area for children.



COMPACT HOUSE PLAN by Philip L. Goodwin submitted in low-cost house competition conducted by New York Chapter, A. I. A. Ample living-dining room; highly convenient arrangement of kitchen, laundry and utility rooms. The addition of garage at side permits location of a garden terrace with privacy overlooking garden. Estimated cost of house, \$3,200 unless entirely fireproof, when it might exceed this cost slightly.



Foundations: concrete or cinder blocks. Studs: wood or metal. Sheathing: 1/2" Transite or similar materials. Roofing: painted tin or lead-covered copper of standing seams. Windows: stock aluminum. Doors: wood painted. Interior floor beams: wood or metal. Floors: pine, linoleum covered. Insulation: aluminum insulating paper. Heating: oil or gas burner; humidified air with summer circulation.

PLANNING ECONOMIES

In locations with mild climate, as the South or the West Coast, open porches used as sitting spaces may also serve as passageways to bedrooms. This may eliminate interior halls.

Where a cellar is provided, the stairway should be planned to permit cellar stairway descent from kitchen.

A slight widening or lengthening of the garage will give extra space for bulk storage of screens, lumber, garden tools, etc.

A trunk rack at the end of the garage may be placed over the low front end of cars and give additional storage without increase of the garage size.

Store screens (1" x 2" frame racks) under ceiling of garage.

Combine kitchen and laundry by extending length of kitchen, or similarly combine kitchen, laundry, and utility rooms. Space and material for door and wall can be saved in this manner. If desired, visual separation can be achieved by a canvas curtain.

In bedrooms all furniture may be built-in. The combination of wardrobe closets, linen drawers and dressing table will save much space and eliminate all other areas except for beds and circulation (illustration, page 148). Built-in furniture increases the contract cost of a house but savings are revealed in room sizes and when considering cost of a house furnished.

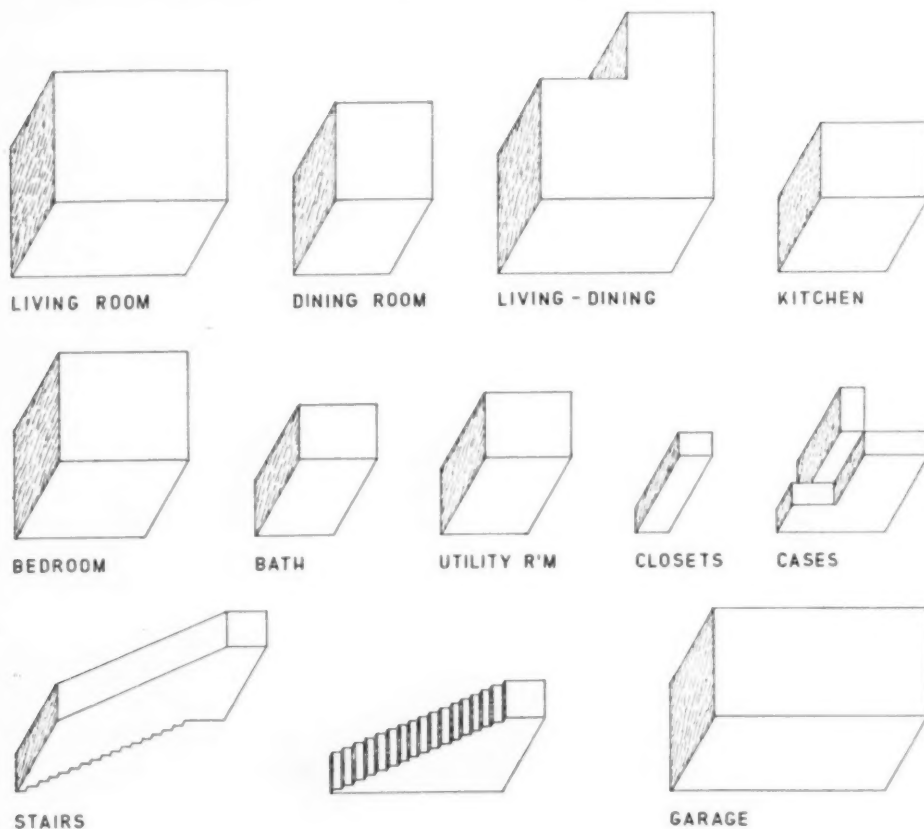
For built-in equipment, such as closets, walls may be most economically built of 3/4-in. plywood. This will produce saving in space from 3" to 5" as compared with conventional stud walls.

In many cases entrance halls may be entirely omitted by the convenient placing of a wardrobe closet with mirror near the outside entrance door to the living room.

One wall of the living room entirely glazed will produce the outdoor feeling of a porch and obviate the need for the latter. A sliding type awning over such a glass wall will provide the necessary protection against too intense sun in warm weather.

**The New Architecture*. By Walter Gropius. pp. 22, 23.

Required Accommodation for the Low-Cost House



SPACE REQUIRED FOR THE LOW-COST PRIVATE HOUSE. For economy, a combined living-dining room is acceptable. A garage, while generally necessary, is not included in the cost range of \$2,400-\$4,000.

Exact minimum standards for room sizes cannot be laid down to apply in all circumstances and in all localities. The room volumes in this study will, it is hoped, be acceptable as a working basis under average conditions. The sizes indicated are more than minimum but are recommended for convenience and workability of house plan. In most cases the dimensions shown exceed the minimum standards set up by the Housing Division of the Public Works and the Federal Housing Administration.

Dimensions of needed equipment and furniture have also influenced the determination of room areas. Each kind of room was studied for the amount of furniture as well as for the equipment that will go into it, and walking space around all of these was carefully considered. The Housing Division of the Public Works Administration recommends the combination of living and dining room for low-cost housing. All bedrooms are made wide enough for occupancy by two persons.

Acceptable Areas:

	Floor Area	Cubage
Living Room, 11'-6" x 16'-0"		
Dining Room, 11'-0" x 11'-0"		
1 Combined Living-Dining Room, 11'-6" x 20'-0" (alternate, 11'-6" x 16'-0" plus dining alcove, 7'-0" x 9'-0")	230 " "	1,840 " "
1 Kitchen, 7'-6" x 10'-0"	75 " "	600 " "
1 Main Bedroom, 11'-6" x 12'-0"	138 " "	1,104 " "
2 Other Bedrooms, 9'-6" x 10'-0"	190 " "	1,520 " "
1 Bathroom, 5'-0" x 7'-0"	35 " "	280 " "
1 Utility Room and Laundry, 7'-6" x 8'-0"	60 " "	480 " "
6 Closets, total area	20 " "	160 " "
Kitchen Cabinets, 20 running feet of shelves		
Stairway and Hall (2 floors)	110 " "	880 " "
Garage not included, 10' x 18'		
Totals for 2 floors	858 " "	6,864 " "

Summary:

Number of rooms 5 Floor Area 858 sq. ft. Net room volumes 6,864 cu. ft.
Such a dwelling, if of two stories and square, would measure approximately 22'-0" x 22'-0" on plan.
Recommended ceiling height, 8'-0".

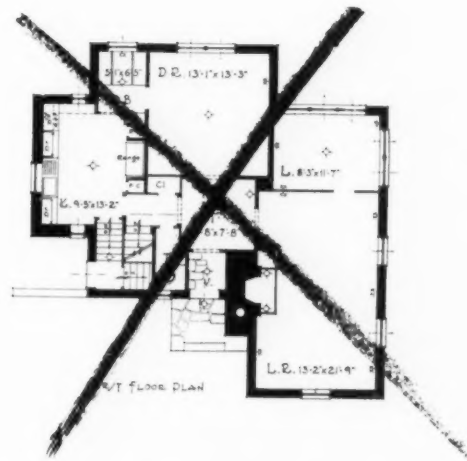
The listed computations of floor areas and cubage are net and do not include walls, roof, floors and foundations.



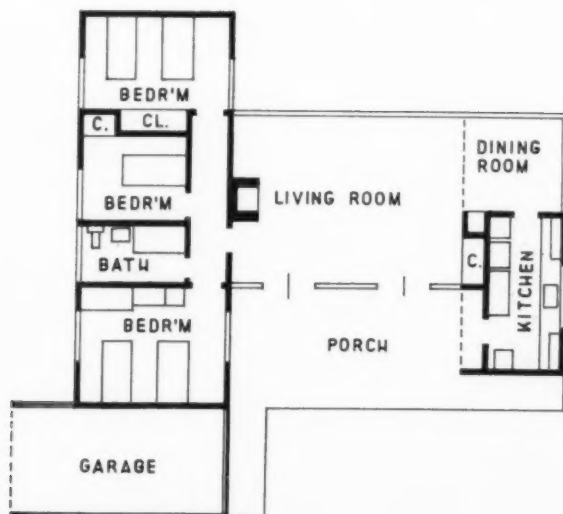
DIAGRAMS OF GROUND FLOOR ARRANGEMENTS to show essential relationship of rooms. (1) Living room, dining room, kitchen: (2) Combined living-dining room and kitchen. Advantages with arrangement (2) are: Greater unobstructed room space; fewer partitions; greater flexibility; better ventilation.



COMPACT PLAN having desirable entrance hall, direct access from kitchen to main entrance door, combined kitchen and utility room, sheltered porch reached from living room or hall. There are three bedrooms on second floor.



HOUSE FOR DEVELOPMENT. Costly because of broken contour of house plan. Lack of simplification of floor arrangement.



THREE-BEDROOM HOUSE ACCOMMODATION ON ONE FLOOR. A large and low-cost plot required. Separation of bedrooms from living area. Desirable relation between living room and porch or terrace. No stairway required. Estimated cost without garage, \$3,800. Design by Albert Frey.

Planning Economies (Continued)

Use insulation board as plaster base so as to combine insulation with plastering.

Economies through simplification of framework can be obtained by roofing of the room volumes with shed or flat-type roofs, rather than the conventional gabled or hipped roof.

Installation of a metal air chamber type fireplace, lined with ducts and having air grilles, will help to heat the living room and an adjoining bedroom or may be the only heat source in localities having a mild climate.

Exterior doors with screened casement insert may take the place of both door and window.

FINISHES

Integrally colored stucco on walls and ceilings of rooms gives a satisfactory finish at little greater cost than straight plaster finish, which would often require an additional cost for painting.

By treating plastered walls of kitchen and bath with a special stucco wax, the costly enamel paint finish can be saved.

A saving in upkeep of exterior trim and woodwork can be obtained by use of aluminum paint which gives surface protection and does not fade.

Aluminum paint over composition roofs will help to keep houses cool in summer by reflection of solar heat rays or it can be used as base coat for ordinary paint on decks. It prevents bleeding-through of asphalt.

EQUIPMENT

In kitchens, sink compartments of acid-resisting enamel, built into an ash or maple drain board and counters, cost less than individual and complete sink or drain board units which, besides, are difficult to fit into cabinet units.

Hosebibs for garden sprinkling at outside of house should be placed at short distance from interior piping of cold water, thus saving on pipe and trenches.

OTHER ECONOMY FACTORS

Adopt room sizes to permit standard length materials (no cutting).

Shape of house approaching a cube.

Utility room as substitute for cellar.

Standard size and type; doors, windows, cabinets.

Ordinary wood window frames for stud wall construction (window opening 2'-4" x 4'-6") in the knock-down made of Ponderosa Pine with pockets and pulleys. The price is \$3.18 each. The ordinary window, two lights, check rail, opening 2'-4" x 4'-6" in 1 3/8" thickness, glazed with SSB ordinary window glass. The price per sash is \$1.94. Windows of better grade are recommended where possible. Highest quality double-hung sash cost \$8.50-\$11.90 per window, including screens and weather-stripping.

Standard size doors. Ponderosa Pine, four or five panels: 2'-6" x 6'-6" cost \$3.77; 2'-8" x 6'-8" cost \$4.01. Birch doors, two panel: 2'-6" x 6'-6" cost \$5.90. Exterior doors of white pine: 2'-10" x 6'-10", 1 3/4", cost \$11 and upward.

Partitions reduced to minimum.

Insulation used as sheathing or plaster base.

Fill, blanket, or structural insulation reduces required radiation and boiler size.

Insulation board as ceiling, left natural or painted.

Required Rooms



Anderson

ANGLE OF LIVING ROOM with book shelves and cases under windows. Walls of pressboard. William Wiide, architect.



COMBINED LIVING-DINING ROOM. Above—showing use of table for living room purposes. Below—showing same table used for dining. Furniture by Gilbert Rohde.



LIVING ROOM

THE SPACIOUSNESS OF THE PRESENT-DAY LIVING ROOM NEED NOT BE LIMITED TO THE INCLOSING WALLS, BUT MAY BE EXTENDED TO THE GARDEN BY MEANS OF WINDOWS AND DOORS THAT OPEN ON TO A TERRACE OR PORCH.

In warm climates the outdoor dining porch or terrace is a necessity and should be located with reference to shade and cooling breezes. It should have privacy and pleasant outlook.

LOCATE LIVING ROOM SO AS TO OBTAIN VIEW (GARDEN, OPEN LAWN, PARK). SOUTH AND WEST EXPOSURES ARE PREFERRED.

LOCATE FIREPLACE WITH RELATION TO FURNITURE GROUPING.

A fireplace of moderate size adds \$100 or more to the cost of a house. Actual cost depends on height, size of fireplace opening, treatment of facing, materials, etc.

LIVING ROOM WINDOW AREAS SHOULD BE AT LEAST ONE-FOURTH OF TOTAL FLOOR AREA.

There should be provisions for screens, shades, and curtains, possibilities for maximum ventilation, unobstructed vision of outside when occupants are seated or standing. Ease of cleaning windows, preferably from interior; operation should permit full opening or at both top and bottom.

DINING AREAS

SIZE OF THE DINING AREA.

The size of the dining area, whether it be a separate room or a part of living room, is determined from the dimensions of the dining table and of the seating area around it. The dimensions given below are sufficient for the determination of the sizes of dining areas of the various sorts required in the average house.*

SPACE REQUIRED FOR OCCUPIED SEAT OR NON-MOVABLE SEAT.

Since the front edge is in a line with the edge of the table, this measure depends on the floor area required by the seat itself; 18" x 18" is a common measure.

WIDTH OF PASSAGES.

Between front of seat and edge of table when seat is drawn back:

To permit person to pass to seat beyond, 12".

To permit person to take own seat, 9".

Between corner of table and corner of adjacent article of less than elbow height, 15". Back of occupied seat and article of furniture of less than elbow height:

For person passing to seat beyond, 15".

For person serving table, 21".

Assuming table width of 34 inches, having persons seated on both sides and with space required for serving, the width of dining space required would be 9 feet, 4 inches.

DINING SPACE IN KITCHEN.

The omission of a separate dining room in the low-cost house makes desirable the provision of dining space or alcove as a part of the kitchen. There are other reasons favoring such provision: (1) convenience of food service; (2) to keep the mess out of other parts of the house, especially when there are children; (3) to provide a place to serve the younger children who eat before or after the other family members.

It is recommended that where dining space is included in the kitchen or an adjoining alcove it be so located as not to interfere with the efficiency of the work area. The space should be large enough to be useful and not too cramped for "real meals." Such areas should be well lighted and ventilated, and they should not duplicate a dining room or increase the difficulties of serving in the dining-living room combination.

If most of the meals are to be eaten in the kitchen a corner can usually be pro-

*Information by Maud Wilson. See *The Architectural Record*, April 1934, page 329.

Dining Room and Kitchen Planning

vided for serving food without interfering with the food preparation. The same table may be used for preparation jobs such as canning or for extra service space when the meals are served in the living or dining room.

THE DINING ALCOVE, AS PART OF LIVING ROOM, REQUIRES LESS FLOOR AREA THAN A SEPARATE DINING ROOM.

Width of alcove may range from 9 feet, 6 inches to 12 feet. When the dining table is placed in an angle of the living room, unusual demands for seating are cared for by usurping a part of the actual living room space.

THE DINING AREA CAN BE CONVERTED TO OTHER USES SUCH AS A STUDY FOR SCHOOL CHILDREN OR FOR ENTERTAINING.

POSSIBILITIES FOR SCREENING TABLE WHILE IT IS BEING PREPARED FOR MEALS.

Standard folding partitions, curtains, movable screens.

WHERE EVERYDAY MEALS ARE SERVED IN DINING AREA OF LIVING ROOM, THE DISTANCE BETWEEN DINING TABLE AND SERVING AREA OF KITCHEN SHOULD BE AS SHORT AS POSSIBLE.

DINING TABLE USED FOR EVERYDAY MEALS SHOULD BE SO PLACED THAT IT DOES NOT REQUIRE MOVING IN SETTING IT FOR A MEAL.

SPECIAL LOW TABLE FOR CHILD OF LESS THAN THREE YEARS OF AGE.

WHEN BENCHES ARE USED, THE LIGHTWEIGHT MOVABLE SINGLE BENCHES WITH HANDHOLDS ARE PREFERRED TO FIXED BENCHES SEATING MORE THAN ONE PERSON.

AN OUTDOOR DINING AREA IS DESIRABLE.

This should adjoin kitchen or dining room. The location should have privacy, shade, and view.

PROVIDE OVERHEAD ILLUMINATION FOR DINING TABLE.

THE KITCHEN*

The kitchen is the work center of the house and the efficiency of the entire household depends to a large extent upon the plan and arrangement of this center. For the *low-income class* the kitchen as a work center is not confined to food preparation but may include home laundering, canning, and possibilities for dining in the kitchen.

There is no one model or ideal kitchen plan. Any kitchen, to be convenient, must be adapted to the needs of the type of family most likely to occupy the house. These needs vary with the size and composition of the household, the amount of entertaining that is done, the standards for meal preparation and service, the amount of food purchased ready prepared and the utilities available. Type kitchens are here set up which will meet various needs.

Certain equipment is required in every kitchen: A range; water supply and sink; work tables or work surfaces at satisfactory heights; refrigeration; and adequate space for utensils and food not requiring refrigeration. This space, of course, should be located as nearly as possible where these articles will be used.

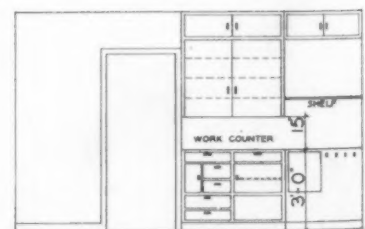
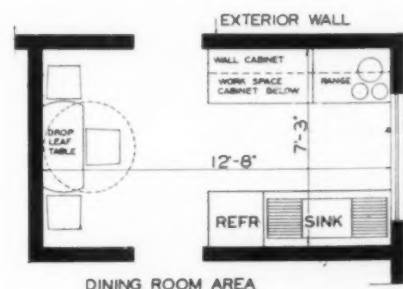
Kinds of Work To Be Done. Kitchen equipment should be selected and arranged with reference to the different kinds of work which must be carried on in the kitchen.

(1) *Preparation of foods for cooking.* Vegetables are prepared at the sink and small quantities should be stored nearby. Short mixing jobs are done near the stove, and longer jobs at a work table which should be located near the main storage center, so staple supplies will be at hand. If possible, the refrigerator should be nearby.

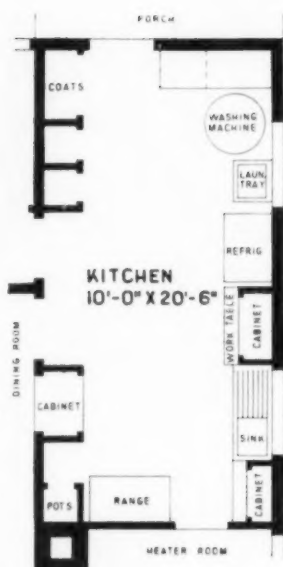
*Developed from information supplied by Dr. Louise Stanley and Maud Wilson, Home Economists, Bureau of Home Economics, U. S. Department of Agriculture, Washington, D. C.



DINING ALCOVE IN LIVING ROOM. Partition produced by simplest means, namely, 1" plywood with lumber core.



KITCHEN WITH BREAKFAST-DINING SPACE; range on opposite wall from sink; light on sink from left; work space independent of passage between doors. Prepared by Division of Home Economics, Washington, D. C.



KITCHEN AND LAUNDRY. Work table, sink and cabinets on one wall. Range at end wall.

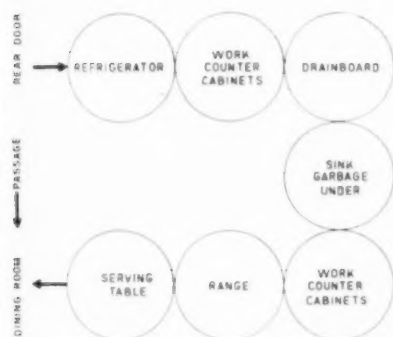
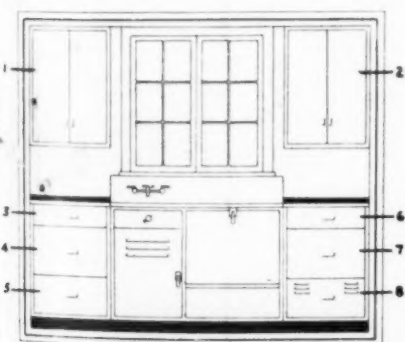


DIAGRAM OF KITCHEN, showing location of equipment with regard for sequence of work in food preparation and service.



WESTINGHOUSE ELECTRIC KITCHEN. Wall cabinets, (1) Dish storage; (2) Glassware storage; Drawers, (3) Top drawer, silver; (4-5) Center and lower drawers, saucepans and cooking utensils; (6) Top drawer, cutter board and small food preparation equipment; (7) Center drawer, baking dishes; (8) Lower drawer, non-perishable vegetable storage.

(2) *Cooking.* The range should be easily reached from food preparation and service centers; it should be well lighted, and the utensils used there should be stored close at hand.

(3) *Serving.* For this there should be a collecting station between the stove, the refrigerator, and the dining table. If there is a cupboard between the kitchen and the dining room, a shelf on a level with the work center serves this purpose. A wheel table makes a desirable serving surface for the housewife. The food can be arranged upon it and wheeled into the dining room at one trip. If families entertain much there should be facilities for increasing serving space by means of a hinged shelf or movable table.

(4) *Cleaning up and dishwashing.* A center for this work should include provisions for receiving soiled dishes, scraping and sorting, washing and rinsing them, draining and stacking the clean dishes. A satisfactory dishwasher, located away from the all-purpose sink, is possibly the ideal solution for the dishwashing problem, but as yet this is too costly for most homes. Next best is a separate sink planned for dishwashing. For the lower-priced homes the all-purpose sink should be selected and located with the different needs in mind. A double-compartment sink simplifies the dishwashing job. Otherwise the sink should be of sufficient size to accommodate a dishpan and for convenient handling of the dishes.

Arrangement of Equipment for Efficiency. The various pieces of kitchen equipment are available at different cost levels and in great variety of size, quality, and finish. Wise selection of equipment is always an important factor in efficiency, but equally important is the arrangement of the large pieces of equipment in a step-saving sequence to form a compact working area.

Sequence of kitchen jobs. In general, the jobs indicated above as being carried out in a kitchen follow a definite order. The raw food is collected, prepared, cooked, and served. In the cleaning up process, the soiled dishes are removed, scraped and stacked, washed, drained, and put away. This furnishes a guide to the order in placing the equipment on the floor plan. In the preparing process, first the food storage cupboard and refrigerator, the work surface and usually the sink, then the stove, and last the serving table. In the clearing away process, first the stack table, then the sink, then the drain board, and last the shelves for china.

In the preparation sequence, the work can proceed either toward the right or toward the left, but should end at the door to dining area. In clearing away, however, work proceeds most efficiently to the left. For each dish or utensil as it is washed is held in the left hand, and if the drain board is on the right side of the sink, the left hand must cross over the right with every piece that is put down.

The arrangement possible is limited by the size and proportions of the room and the location of the door openings. So it is important that the architect have in mind a definite plan for placing the kitchen equipment before finally fixing these structural features.

In case all the desirable equipment cannot be had at one time the kitchen should be planned about that which the client hopes ultimately to have. This will mean using cheaply constructed tables and shelves until such time as the more permanent ones are available.

Kitchen Planning (Continued)

STUDIES IN KITCHENS WITH DIFFERENT ARRANGEMENTS HAVE RESULTED IN THE FOLLOWING DEFINITE RECOMMENDATIONS AS TO THE LOCATION OF SPECIFIC PIECES OF EQUIPMENT.

Sinks should be installed with drain board to the left and flat surface or drain board to the right, both at height of top edge of sink. A double sink should have flat surface at either side. The drain board, or surface at the left of the sink, should be at least 32 inches long and the stacking surface at the right at least 36 inches. The sink, to be large enough to hold a dishpan, should measure 18 by 22 inches, with a minimum depth of 6 inches. There should be open space under the sink itself so as to allow knee room when seated. Some space within reach of the sink should be available for narrow shelves for the storage of cleaning materials, and a wider shelf or cabinet nearby for the storage of any materials or utensils used there first. Small utensils used at the sink, dish scraper, paring knife, can opener, etc., should be hung within easy reach. A cabinet with outside ventilation for vegetable storage, or a draft cupboard, is desirable near the sink. Most vegetables deteriorate rapidly at room temperature unless proper ventilation is provided.

The sink should be well lighted with a window preferably in the wall at right angles, so placed as to throw light on the sink. If the window is on the same wall, it should not be placed directly over the sink unless on the north side or unless there is some protection from the glare. If the window is placed over the sink, it should be sufficiently high for the back of the sink to fit underneath and still allow space for a small shelf. Artificial light should be so placed as to provide good light on the work at the sink without throwing a shadow.

If dishes are to be stored in the kitchen, the storage should be above the left drain board or within reach of it. Dish storage accessible from both kitchen and dining room saves steps. In this arrangement the sink must be on a common wall between the kitchen and the dining room or on a wall at right angles. When dish storage is not possible within reach of the sink, a wheel table is desirable.

The Range may be at right angles to the sink, or directly across from the sink if the kitchen is narrow. Shelves or a cabinet for storage of utensils used at the stove should be within reach of the cooking surface. A small preparation surface or table (which may be movable) should be available adjoining the stove (burner portion) at the same height as the burner, and if at the dining room door or pass cupboard, it can be used also as a serving surface.

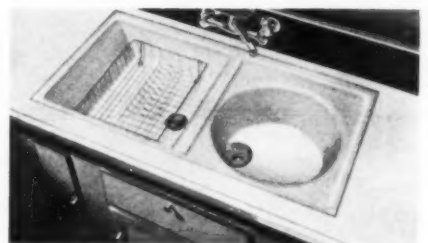
The Serving Surface should be located between the stove and the area where food is most frequently served. It may be a part of the stove center or of the sink center. Space should be provided in this center for any foods not requiring refrigeration and used without additional preparation, such as bread and cake; for serving dishes and silver; and for trays.

The Work Table for long mixing jobs, such as bread-making, cake-making, and dessert, should be of such height as to permit work sitting, and should have knee space below. Staple supplies should be within reach of the worker so seated. This work table should, if possible, be near both the refrigerator and stove.

The Refrigerator should be as near as possible to both work table and stove, and also near the serving center. That is, from the point of view of convenience in use the refrigerator should be given a central location rather than one out of the sequence as is so often planned. It must be remembered, however, that the higher the surrounding temperature the greater the cost of operation of the refrigerator. In most cases the housewife prefers convenience at a slight increase of expense in operation. If an ice refrigerator is used, a position near the door facilitates icing. A properly constructed draft cooler is desirable in most climates and makes possible a more efficient use of the space in the refrigerator.



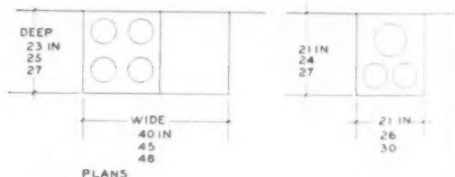
DOUBLE COMPARTMENT SINK with bowls for dishwashing and draining, each equipped with a dual shut-off strainer. Counter top and splash back surfaced with Napanee (linoleum). J. P. Cox & Co., White Plains, N. Y.



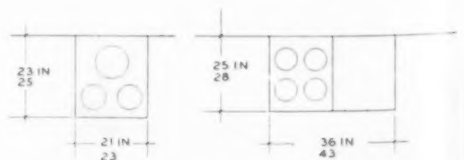
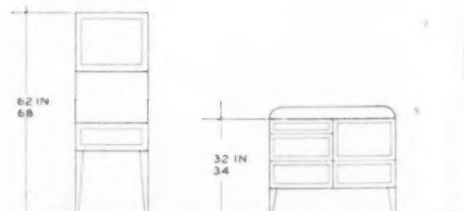
COUNTER surfaced with Napanee (linoleum). Edge of stainless steel. This type of sink (bowl only) is inexpensive, costing from \$8 to \$10. The counter board is installed to any required length.



ELEVATIONS



PLANS



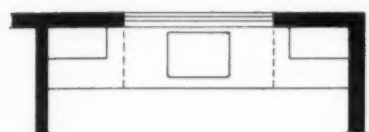
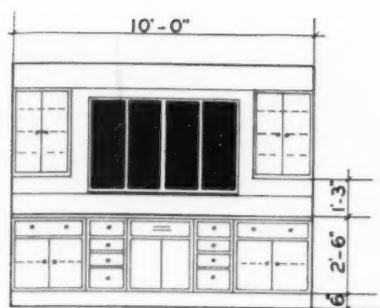
GAS RANGE DIMENSIONS.



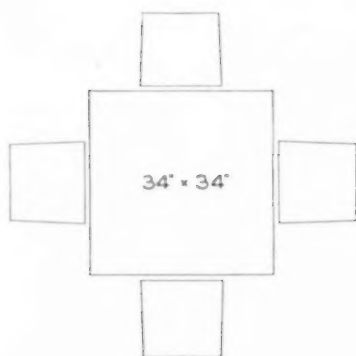
KITCHEN
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TYPICAL
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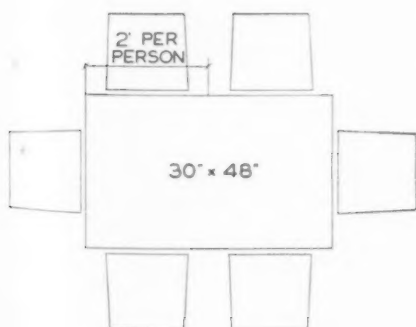




KITCHEN WITH ALL BUILT-IN EQUIPMENT. Indication of desirable counter height and space under wall cabinets. Courtesy, Janes and Kirtland, New York.



TYPICAL TABLE SIZES AND CHAIR SPACING.



Size and Shape of Kitchen. Since the wall space is needed for placing equipment, the rectangular kitchen makes possible a more satisfactory arrangement than a square one. Unless a coal or wood range is used the width should not exceed 8 or 9 feet. A kitchen should be at least six and a half feet wide, otherwise only one side wall can be used for placing equipment, which is inefficient. The kitchen floor plan with all the proposed equipment should be drawn to scale before final decision as to location of openings and of utility outlets. So far as possible, the work portion of the kitchen should be kept free from doorways to prevent breaks in working surfaces and a traffic way across the work area.

Height of Working Surfaces and Storage Cabinets. Convenient heights for working surfaces and storage spaces planned to minimize stooping and stretching contribute much to the efficiency of the kitchen. The sink and work surfaces for short jobs should be at satisfactory heights for work standing. This varies with the worker, good averages being from 34 to 36 inches. Work surfaces for longer jobs should be provided with knee space underneath and arranged at a suitable height for work sitting either on a stool or in a comfortable chair with both feet on the floor.

Storage space should be adapted to the size of the articles to be stored and placed, so far as possible, where the particular articles will be first used or most often used. The large one-purpose kitchen cabinet has served its day. It is replaced with built-in units placed where needed. Unfortunately, too many of these installations are planned by the architect or manufacturer and with too little knowledge of the kitchen activities and articles to be stored. As a result, there is likely to be an over-elaboration of cabinet space, artistically balanced, but poorly arranged in relation to size or location of the articles to be stored.

The same amount of cabinet space, if arranged with reference to the activities of the kitchen and the equipment to be stored, will make possible much more efficient work. Kitchen units of standard size planned for specific uses allow great flexibility in arrangement, but any satisfactory arrangement must be carefully thought out.

A satisfactory procedure in determining the built-in facilities is first to decide on the amount and the location of work spaces required following the above listing of tasks to be done. No more work table space should be planned than is actually needed, not only for the sake of keeping down the cost of built-ins but also to keep the floor area as small as possible. Having decided the amount and location of work table spaces, the next step is to plan the wise utilization of the cabinet spaces above and below each work area. In most home kitchens this will take care of all the articles to be stored; if not, floor to ceiling storage cabinets can be used to advantage for the extra space necessary.

CLASSIFICATION OF SUPPLIES AND UTENSILS TO BE STORED

As a guide in planning these storage spaces the following classification of material to be stored has been prepared by Maud M. Wilson. ("Closets and Other Storage Arrangements for the Farm Home," issued by Bureau of Home Economics, U. S. Department of Agriculture):

Serving center

- Bread; cake; cookies.
- Ready-to-eat cereal; crackers; wafers; zwieback; rusks; etc.
- Loaf sugar; honey; candies; dried fruits served from packages.
- Relishes not requiring low temperature.
- Bread and cake knives; bread board; cake rack.
- Ladles and serving spoons; serving forks; butcher knives.
- Dishes, silver, and linen used for everyday meals (unless warmed compartment is provided for platters, vegetable dishes, plates and cups).

Kitchen Planning (Continued)

Dishes, silver, linen, and table decorations used for company meals, and infrequently used dishes, unless storage is provided in dining room.
Mats for hot dishes.
Serving trays.

Sink center

Stew kettles; double boilers; sauce pans.
Dried fruits which require washing or soaking.
Colanders; strainers.
Ice cream dipper.
Paring knives; slicing knives; scissors; vegetable brushes.
Dishpans; rinse pans; dish drainers.
Pot cleaners; cleaning brushes.
Sink strainers; dish scraper.
Dish towels; dish cloths; hand towels.
Soap containers.
Garbage containers.
Drinking glasses.
Cloth for wiping up spilled water from floor.
Drain cleaner; scouring powder; soap.
Hand lotion.

Mixing center

Flour; meal; other uncooked cereals used mainly in preparation of made dishes.
Sugar.
Leavening agents; dry yeast.
Cornstarch; gelatin; junket; macaroni, tapioca.
Spices; flavorings, and colorings used in made dishes; cake decorations.
Dried fruits used without washing or soaking.
Mixing bowls; chopping bowl.
Measuring cups.
Grinders; choppers; shredders; graters; reamers; nut crackers; scissors; egg beaters; egg whips; meat pounder; meat saw.
Spatulas; knives; mixing spoons; measuring spoons.
Dough cutters; sifters; rolling pins.
Cake decorators, cookies "guns," etc.; molds.
Baking pans—bread, cake, pies, muffins, cookies, casseroles.
Boards—pastry, meat, vegetables.
Electric mixer.
Wax paper; paper napkins (for lunches); paper dishes.
Recipes.

Stove center

Coffee and coffee substitutes; tea.
Salt; pepper; other seasonings. Flour in dredger.
Ladles; stirring spoons; masher; ricer.
Spatulas; turners; forks; wire toaster.
Skillets; griddles; broilers; roasters.
Coffee pot; tea pot.
Utensil lids.
Deep-fat kettles and basket.
Pressure cooker and steamer.
Thermometers.
Pan-holders; lifters.
Matches; stove polishes.

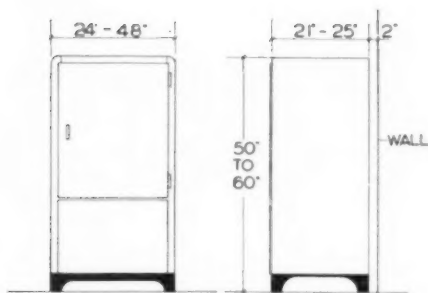
Draft cooler

Fresh fruits and vegetables, unless highly perishable.
Cured meats; cured cheese.
Cooking fats.
Sirups; molasses.
Chocolate; cocoa; coconut; malted milk.
Opened jellies; jams, relishes, etc. Candied fruits.
Salad dressing; vinegar.
Unshelled nuts.
Bouillon cubes.

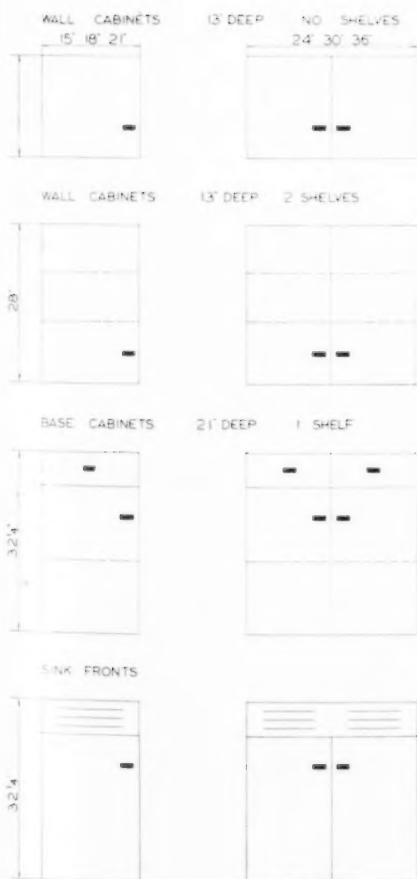
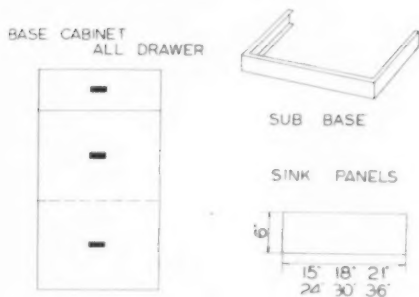


Hawthorne Studios

CABINET WITH REVOLVING SHELVES. for storing foods, canned and bottled goods. Trays can be removed from frames for clearing. Shelves cannot be reached by ants. The costs of one unit, with one set of vegetable baskets, is: 14", \$11; 16", \$12.50, nickel-plated steel finish. Cost for aluminum, 16" size, \$17.70. Manufactured by E. S. Roberts, 107 South Serrano Avenue, Los Angeles.



STANDARD REFRIGERATOR DIMENSIONS.



Kitchen cabinet sizes, base and wall types.

Refrigerator (allowing minimum space because of cost)

Foods requiring chilling before use.

Left-over foods; perishable foods prepared in large quantities.

Milk and cream; butter; eggs; fresh meat.

Highly perishable fruits and vegetables.

Salad oil; peanut butter; shelled nuts; cod liver oil.

Opened packages of perishable foods—fruits, vegetables; meat, fish, evaporated milk.

Soft yeast.

Unassigned

Containers used for foods kept in cooler or refrigerator should be kept near work surface which is most convenient to use in transferring foods to them.

Unopened canned foods.

Empty fruit jars, before taking to food storage room.

Kitchen aprons.

Scales. Can openers; bottle openers, etc.

Tub for ice-cream freezer.

Popcorn; popper.

Sacks; wrapping paper; string.

Hammer and other tools; knife sharpener.

Picnic kit.

Clean rags, cheesecloth, etc.

Electric toaster; waffle iron; percolator; electric cords.

Waste basket. Paper; pencil.

Table leaves; false table-top (unless storage is provided outside kitchen).

Water jugs.

Construction of Kitchen Storage Facilities

Shelves should be readily removable and adjustable as to distances apart.

More efficient use can be made of space intended for articles which will hang, such as door or side of cabinet, if the material used for lining permits one to place a hook wherever desired.

An upper cabinet should be made as shallow as possible, allowing for a single row of the largest articles that are to be stored in it.

Movable trays are better than shelves in compartments below work counters. The trays should be two to six inches narrower than the compartment itself, to allow space for articles hung or placed in racks on the door.

Drawers may be used advantageously as bins. Larger drawers with several movable metal insets are preferable to small drawers for supplies stored in less than twenty-five pound lots.

The farm kitchen, while not the subject of this study, may be mentioned as being traditionally larger than the urban kitchen. It developed this way because of the use of the kitchen as a living and dining center, and the provision for carrying on there a number of activities in a separate workroom or a segregated portion of the kitchen. This makes possible the planning of the space devoted to food preparation on a more efficient basis and follows the same general principles outlined above. Where a wood or coal range must be used, additional width may be needed.

Other Specification Items

Built-in ironing board, 48" to 56" high, 12" to 16" wide.

Sink counter of ash, 1½" thick.

A cheap installation can be made by using a 1½" thick counter board of clear ash, grooved for drain and recessing a porcelain lined sink. Wood counters of spacious size are preferred by many. The wood counter may also be surfaced with linoleum.

Where ice-refrigerator is installed, provide drainage to separate sump, not to sewer. Provide deep trap under refrigerator.

Kitchen Planning (Continued)

Provide light, washable finish to walls; white ceiling, color to side walls; use enamel paint over hard plaster; use may be made of *Flexboard* for walls of kitchen.

Build in electric clock at time of constructing house.

Build in can and bottle opener.

Provide attachment for meat chopper.

As far as Government housing of low-cost is concerned, the separate dining room has been ruled out. This necessitates providing space in living room for dining and preferably some space in kitchen for eating purposes. (Standards for Housing Requirements set up by PWA Housing Division.)

Lighting

Artificial light in the kitchen should be uniformly diffused and quite shadowless. Indirect light is preferred but more costly than direct lighting.

Electric sockets in kitchen should be of porcelain and, where drop chain is provided, there should be an insulated pull-knob to prevent electric shock.

Where one light is provided in kitchen, the location should be at ceiling directly over the sink. A supplementary light is desirable over the cooking range.

Kitchen Floors

Kitchen floors should be non-slippery, non-absorbent, durable, easy to clean by scrubbing and not tiring to walk on.

Cork has most of the qualities suited to the ideal kitchen. It is easy to walk on, resilient, quiet, warm and superior to oak or pine floors for wear. It is more costly than linoleum or mastic tile. It is kept in order by washing and some waxing. It is applied with waterproof mastic on a sub-floor of California redwood or pine or on a sub-floor of waterproofed concrete.

Linoleum makes a very satisfactory and cheap kitchen floor surface. It can withstand hard wear, is easily cleaned by scrubbing and is satisfactory for walking. It comes in six-foot widths and can be laid with few joints. Lay over felt layer with glue supplied by manufacturer. Provide space for expansion at wall edges. Linoleum should not be laid over concrete slab at ground unless concrete has been waterproofed.

Composition. This composition is widely used for floors of busses and railroad cars. It consists of magnesite, sawdust, wood flour and other aggregates. It takes a smooth surface and has some resilience. The cove skirting can be integral with floor. Follow recommendation of manufacturer.

Walls and ceilings for kitchens where plastered should be plastered with Keene's cement with smooth-finished surface and, when thoroughly dry, painted, enameled or lacquered. Enamel should be applied over a special zinc undercoating. See U. S. Government specification for applying paint over plastered walls. $\frac{1}{8}$ " cement-asbestos board makes a satisfactory kitchen wall finish. This material may be obtained in a variety of colors. Metal jointing strips may be obtained, when required, from the manufacturer.

Some of the desirable arrangements for kitchens are as follows:

Kitchen, utility room and laundry combined as one long room. See plan, page 89.

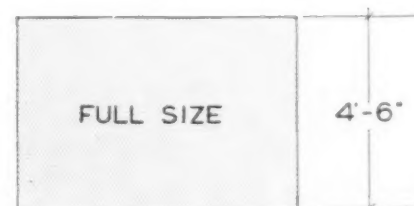
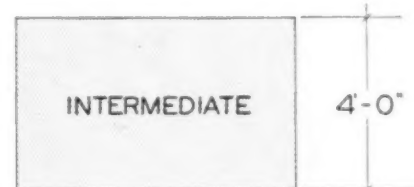
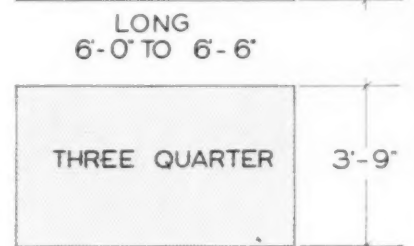
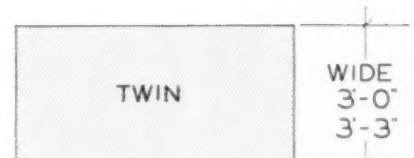
Kitchen dining table, accommodation for five, on the same side of work area as the door to the dining space in living room.

Refrigerator near work table and serving area.

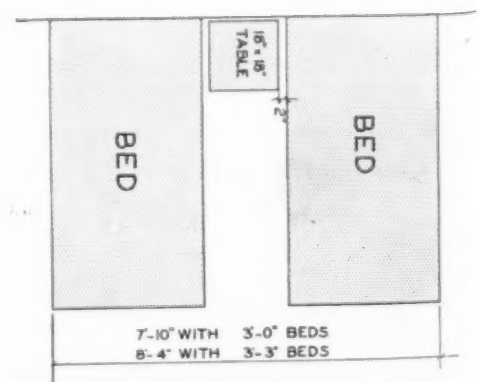
Range between sink and work table units.

Sink and work table opposite.

Sink and serving units combined so that the serving counter may also be a drain board.



BED SIZES for use in planning the bedroom.



BED WIDTHS AND REQUIRED SPACING OF TWIN BEDS.

Bedroom and Bathroom Planning

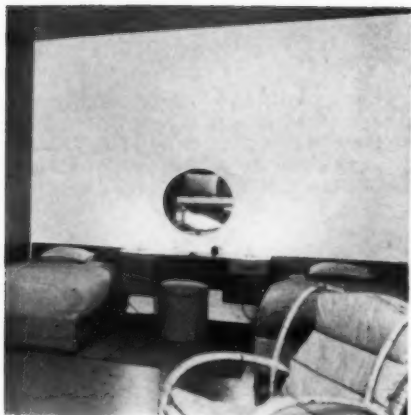
Articles of equipment stored near where they are used.

Supplies that do not deteriorate unduly in room temperature stored near point of use.

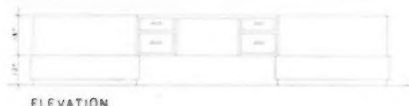
Shelf or shallow cupboard near sink for drinking glasses, cleaning powders, etc.

Provide a stool to be used at sink.

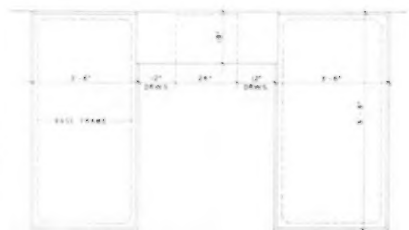
Roller shades instead of doors used on cupboards.



Willard

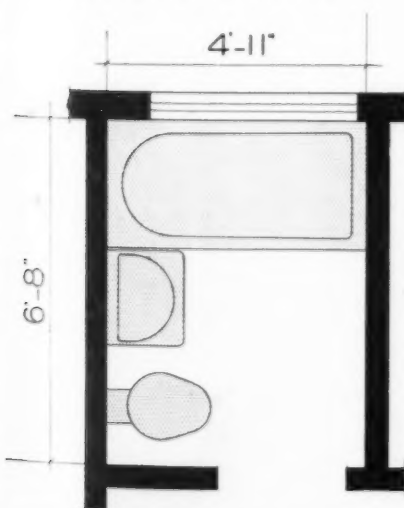


ELEVATION



PLAN

TWIN BEDS, built-in, with dressing table between. A space-saving arrangement. By A. Lawrence Kocher and Albert Frey.



BATHROOM PLAN showing location of fixtures and dimensions, recommended by the Housing Division of the Public Works Administration.

BEDROOM

SPACE FOR DOUBLE BED OR TWIN BEDS IN MAIN BEDROOM.

SPACE FOR TWO SINGLE BEDS, EACH 3'-3" WIDE, IN OTHER BEDROOMS.

SPACE AT BOTH SIDES OF BED AND PASSAGE AT FOOT.

Width of space at side of bed, for convenience of person making it, 20".

Width of passage at foot of bed, 20".

FULL VISION MIRROR.

Preferably on wall near dressing table for main bedroom.

TWO CLOSETS FOR MAIN BEDROOM.

ONE CLOSET EACH FOR OTHER BEDROOMS.

A double closet or two single closets preferred.

FURNITURE FOR MAIN BEDROOM.

- 1 double bed or twin beds
- 1 dresser
- 1 chest of drawers
- 1 stand at bed
- 2 chairs

FURNITURE FOR OTHER BEDROOMS.

- 1 or 2 single beds
- 1 chest of drawers
- 1 small table
- 1 or 2 chairs

ROOF DECK OR OPEN PORCH.

As place for outdoor sleeping in summer.

BATHROOM

THE BATHROOM SHOULD BE LOCATED CONVENIENT TO ALL BEDROOMS AND TO STAIRWAY.

A standard-size bathroom, 4'-6" by 6'-8", is recommended by the PWA Housing Division for multi-family housing projects under Federal supervision. The setting up of an exact size for the house is not entirely practicable. This is because house planning is less uniform than the planning of apartment units. The dimensions adopted for apartments may, however, be accepted as minimum standards with modifications required by framing of adjoining bedrooms and closets.

THE BATHROOM REQUIREMENTS MAY BE SUMMARIZED AS FOLLOWS:

- Convenience in planning (placing of fixtures without interference, one with another; spacious dressing space).
- Ample daylighting, exposure preferably south or west.
- Modern sanitary fixtures.
- Smooth and sanitary walls and floors.

FLOORING.

Linoleum, cork, composition.

PROVIDE SHUT-OFF COCKS OR VALVES FOR CONTROL OF WATER.

RECESSED MEDICINE CABINET WITH MIRROR AND LIGHT.

Sizes, 16" to 20" wide, 20" to 30" high, 3" to 4" deep.

Closets and Other Storage

TWO HOOKS ON INNER SIDE OF DOOR.

SOAP RECEPTACLE FOR TUB.

TWO TOWEL RACKS.

TOILET PAPER RACK.

SPACE FOR LAUNDRY HAMPER.

HOOK AT TUB FOR HOT WATER BAG.

OUTLET FOR ELECTRIC HEATER AND CURLING IRON.

PROVISION FOR VENTILATION.

WHAT CLOSETS AND STORAGE SPACE ARE REQUIRED FOR THE TYPICAL LOW-COST HOUSE?

KINDS OF STORAGE.

The modern and convenient kitchen includes provision for cabinets for general storage of utensils and foodstuffs. The first step in determining the amount of required storage is to decide on the amount and location of work space required. Having decided on the minimum requirements for work table space, the next step is to plan location of cabinets to space above and below the work tables or counters. (See listing of articles for kitchen storage, pages 97 and 98.)

CAPACITY AND ASSUMED METHOD OF STORAGE FOR A HOUSE FOR SMALL FAMILY:

Shelf Space	Width	Length
For utensils	12"	7'
Dishes for six	12"	7'
Large quantity staples	16"	5 1/2'
Other foods	12"	20'

Space for Hanging Articles

Large articles 18" wide

Small articles on door

Flat articles, such as pie tins, 2 slots 3" wide.

Lids—in rack on door.

Note: Large cans and two-quart jars are used for bulk supplies, as flour, sugar, etc.

COAT CLOSET (NEAR ENTRANCE DOORWAY).

Shelf for hats requires average height of 8"; overcoats, 5'; width required for a coat on a hanger is at least 22".

Coats, hats, overshoes, scarfs, umbrellas, gloves.

Provide shelf; hanger rod, top 63" above floor. Extra hooks at wall, 7" spacing.

Required Space
Minimum depth of closet, 2'-0" inside; desirable width, 3'-0".

LINEN CLOSET.

2 blankets, 1 quilt, 2 pillows

8 sheets

8 pillow cases

18 towels

10 wash cloths

3 spreads

Extra storage

3' x 1'-8", floor to ceiling; 3 shelves or trays; 3 drawers.

Top shelf, 15" high.

MEDICINE CABINETS. Standard size (Miami Cabinet) Wall opening, 12" x 16"; outside dimensions, 14" x 24". Price \$7.50. Miami Cabinet Division of Philip Carey Co., Middletown, Ohio.



BROOM AND LINEN CABINETS

Closets and Other Storage

BEDROOM CLOSETS (THREE REQUIRED).

One closet for each bedroom is minimum standard; two closets for main bedroom is preferred; minimum closet size should be 2' deep, 3' wide; 4' width closets are preferred.

Provide storage for:

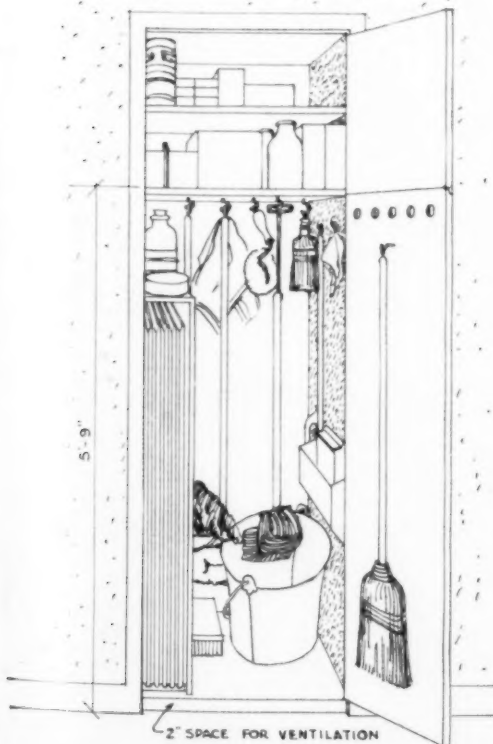
Men's Apparel and Accessories

Hats
Suits
Daily use
Work
Recreation
Overcoats
Shirts
Underwear
Pajamas
Neckties
Collars
Sweaters
Gloves
Scarfs
Handkerchiefs
Collar buttons, studs, clasps
Belts
Socks
Shoes, slippers, pumps
Luggage

Women's Apparel and Accessories

Hats
Dresses
Street
House
Sports
Evening
Coats
Furs
Undergarments
Stockings
Nightdresses and pajamas
Gloves
Woolens
Scarfs
Handkerchiefs
Handbags
Costume jewelry
Suitcases and hatboxes
Umbrellas and parasols
Shoes, slippers

Cleaning Closet (size 14" x 27" or 17" x 25"). Dimensions and arrangement based on equipment and supplies found in representative home or apartment. Five hooks for long articles; four hooks for short articles. Upper shelf 9" deep; lower shelf 14" deep. Designed by Maud M. Wilson, Home Economist.



Full-length mirror on door.

Clothes brush, shoe brush, and whisk broom.

Bottle, spot remover.

Hanging space for suits and overcoats: Hanging rod not more than 5'-10" above floor; drawers for lesser garments, 3" to 4" high; shelf for shoes, 8" high; shelf for hats, 9" high; height for suits, 3'-3"; height for overcoats, 5'-0"; width for 8 suits, 22"; width for 4 overcoats, 12"; depth of closets, 20" to 24".

Hanging space for dresses and coats: Hanging rod not more than 5'-6" above floor; drawers for lesser garments, 3" to 4" high, 12" wide; shelves for shoes, 5" high; shelf for hats, 12" high; height of hanging space, 5'-6"; width for 9 dresses, 27"; depth of closet, 20" to 24".

CLEANING CLOSET.

Dimensions and arrangement of cleaning closet are based on equipment and supplies found in the representative home. Portable ironing board and table leaves may or may not be included here, depending on whether or not space is found elsewhere. The following over-all dimensions would be considered in providing space for cleaning items:

Vacuum cleaner, 49" high, 16" wide, 14" deep, hose 9' long; step ladder, 49" high, 20" wide, 6" deep; ironing board, 62" high, 16" wide, 4" deep; pail, 13" diameter (over handles), 10 1/2" high; table leaves, 13" wide, 54" high; dust mop, 61" long; mop end, 9" wide; wet mop, 57" long; mop end, 7" wide; wall brush, 60" long, 10" wide, 3" deep; dustpan, 34" long, 13 1/2" wide, 3" deep; broom, 54" long, 14" wide, 2" thick; carpet sweeper, 54" long (box, 14" x 10" x 5"); waxer, head, 9" x 5" x 3".

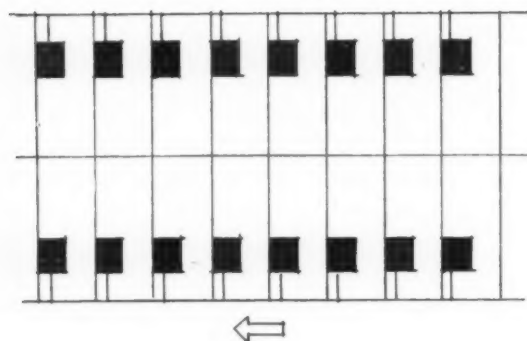
Lower part of closet should be fitted with hooks for equipment that will hang, while the upper is equipped with shelves. If shelving is extended to ceiling, then provide separate doors for upper and lower sections. Upper shelves should be narrower than lowest one.

ADDITIONAL STORAGE.

Baby carriage, 2' x 4' over-all; height, 3' (top down).
Lawn mower
Screens
Garden tools
Children's play cycles

Trunks
Unused furniture
Step ladder

SITE PLANNING FOR LOW-COST PRIVATE DWELLINGS



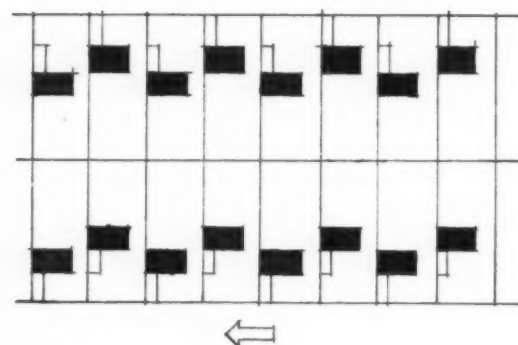
1 WITH PLAN 2

Advantages:

1. All costs of utilities from street to houses equal.
2. Combining of garage walls (if alternating garages are shifted to south lot line).

Disadvantages:

1. Monotony of appearance.
2. Vista to south interrupted.
3. Late morning and early afternoon winter sun cut off.
4. South terrace closed in on two sides by high walls.



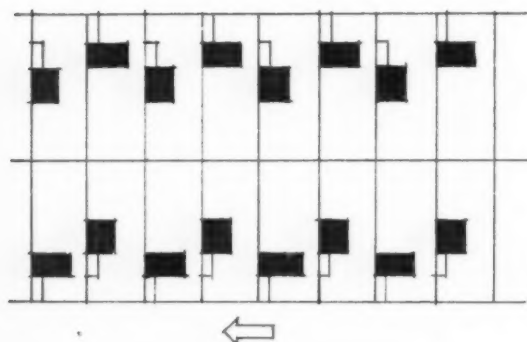
2 WITH PLAN 1

Advantages:

1. Southern vista and noise abatement.
2. Prevailing breeze in second floor.
3. South terrace privacy by low wall of adjoining garage.

Disadvantages:

1. Similarity of appearance.
2. Extra cost of utility service on alternate houses.
3. No combining of exterior walls for garages.
4. Division of garden area in alternate plots by narrow terrace.



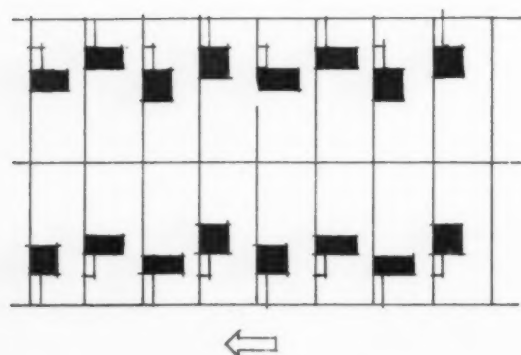
3 COMBINATION PLANS 1 AND 2

Advantages:

1. Relieving monotony.
2. East, south, and west exposures for living-dining, sleeping and terraces.
3. Vista and noise abatement.

Disadvantages:

1. Extra cost of utility service on alternate houses.
2. No combining of exterior wall.
3. Shadow cast by House No. 2 in late morning.



4 COMBINATION PLANS 1 AND 2

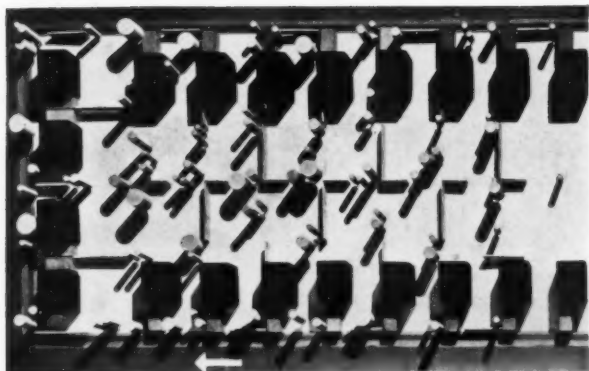
Advantages:

1. Giving maximum variation with these two plans. Every fifth house repeating.
2. Advantage over arrangement No. 3 is that shadow in late morning is reduced.
3. East, south, and west exposures for living-dining, sleeping and terraces.
4. Vista and noise abatement.

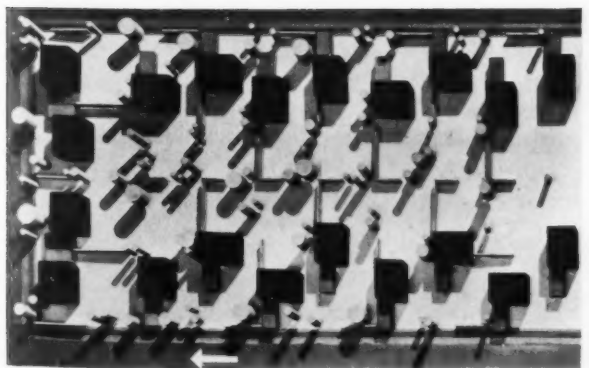
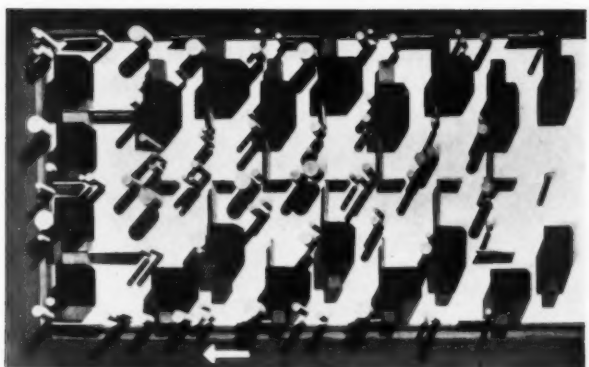
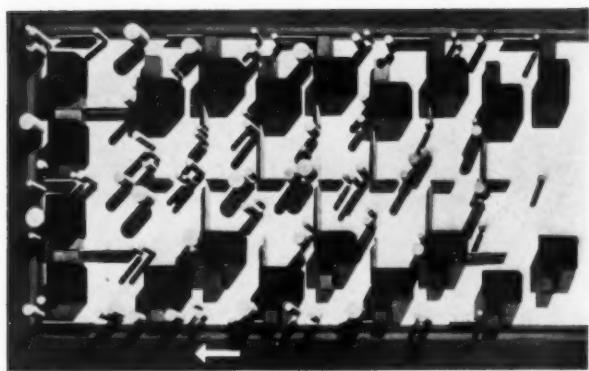
Disadvantages:

1. Extra cost of utility service on alternate houses.
2. No combining of exterior wall.

Prepared by DON E. HATCH, Architect



Photographs by F. S. Lincoln



GENERAL:

This is **not** row housing. Every effort has been made to keep away from a row effect.

This is an attempt toward an "individual" dwelling with all that the term "individual" implies.

An individual dwelling to house a family of four people with an income of approximately \$2,000. It is believed that this annual income economically justifies owning a home which necessitates an expenditure of \$4,000 for lot and house.

An effort has been made to eliminate idealistic obstacles from the path of the small house development and the individual owner. No closing of streets, changing of existing utilities, complicated lot lines, introduction of unattainable materials.

PERTINENT TO GENERAL SCHEME:

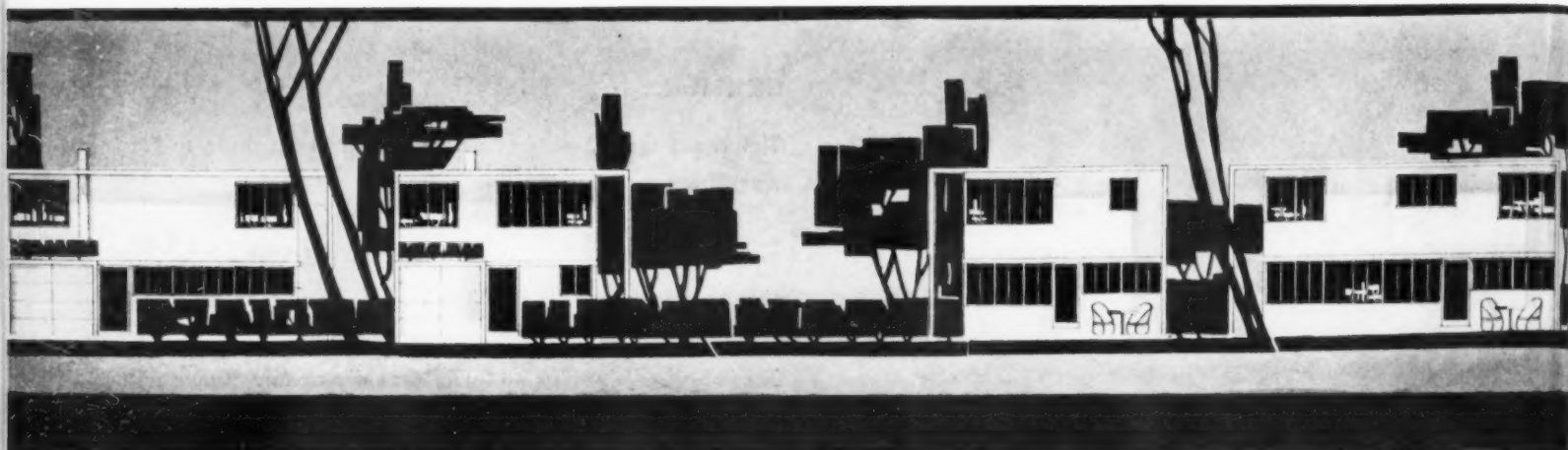
Lots have been divided, for the most part, with a frontage of 40 feet. The price per front foot (100 feet deep) should be approximately \$20, or \$800 for the land with complete public and basic lot improvements.

Houses on 40-foot lots have been kept to one side lot line, insuring concentration of garden areas and development of side terraces. Allowing private mobility from lot line to lot line. No house faces directly on windows or terraces of the adjoining house. The walls adjacent to the side lot line are completely void of windows.

The recommended stagger system of placing the houses on the lots enables each house to have the added vista of the width of the adjacent lot. Insures noise abatement, excellent sun and prevailing breeze.

Both House No. 1 and House No. 2 have a cubage of 8,500 cu. ft. (not including the garage). Both should be built for 28¢ a cubic foot, or a total of \$2,400, leaving \$800 for the garage, living room terrace, driveway, walk and planting.

STUDIES FOR LOW-COST PRIVATE DWELLINGS



FRONT ELEVATIONS

REAR ELEVATIONS

• PLAN 1

LOT. North wall on lot line. Lounging terrace on south with east and west exposures. Shielded from noon sun by wall of adjoining garage. Dining terrace with east and south exposures, with privacy from north by wing wall; close to kitchen. Private mobility from lot line to lot line. Play yard visible from kitchen. Main body of house 22 feet from front building line.



PLAN. FIRST FLOOR. Living-dining with east, south, and west exposures. Kitchen and dining with direct eastern exposure.

Front entrance adjacent to garage door. Entrance space shielded from dining-living space by sliding curtain. Stairs free-standing from wall. Coat and card table storage under stair screened by sliding curtain. Minimum partitions—separating dining-living from kitchen.

Kitchen and utility in one space. Utility with heater, cleaning closet and package receiver, washer and laundry tub. Kitchen arranged in logical sequence with food receiving-storage at refrigerator, preparation and sink, to cooking at range ending appropriately at serving counter at dining door. China, linen, and silver storage above and below serving counter. Single door for serving to dining and access to front door. Minimum duct run from heater to plenum chamber over second floor hall.



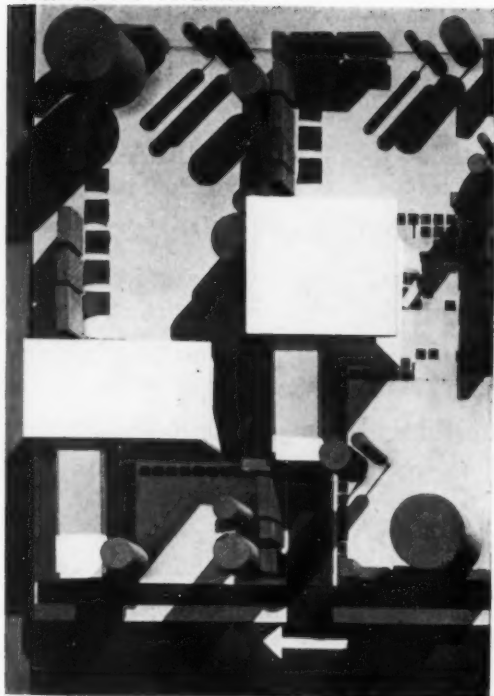
PLAN. SECOND FLOOR. All wardrobes standard, namely, identical in size and forming part of partitions. Bath and toilet separated, making for double capacity of single bathroom.

Sleeping portion separate from dressing by corrugated glass screen, closed off by door from wardrobe. Chilling of all rooms and interior partitions eliminated. Gives warm place for dressing and diminishes peak load and fuel consumption of heating apparatus. Glass screen gives openness of entire room yet privacy in summer when doors are left open. Windows in sleeping portion may be substituted by screens in summer. Openings protected from driving rains by projecting roof and wing walls. Summer and winter location for beds.

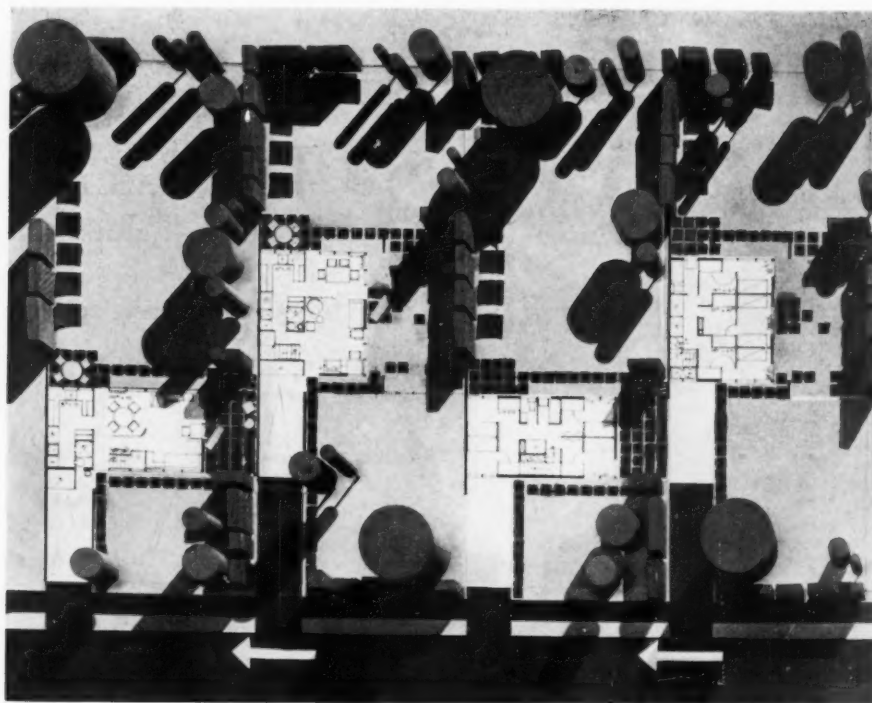
Rooms with southeast, southwest, and east and west exposures.

Designed by DON E. HATCH, Architect

Photographs by F. S. Lincoln



MODEL OF PLAN 1 AND PLAN 2
LOCATED ON A 40-FOOT PLOT



PLAN 1
GROUND FLOOR PLANS

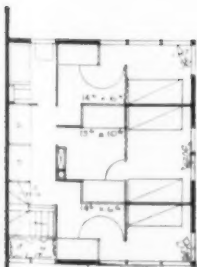
PLAN 2
SECOND FLOOR PLANS

- **PLAN 2** LOT. Concentration of garden area. Gives 20-foot-wide terrace between south wall and south lot line, allowing front and rear garden to flow as one with this terrace as a connecting link. Relieves row uniformity on street side, increasing possibility of individuality. Dining terrace with east and south exposures. Play yard visible from kitchen.

PLAN. FIRST FLOOR. Living-dining with east, south, and west exposures. Kitchen and dining with direct eastern exposure.

Front entrance adjacent to garage door. Stair free-standing. Coat and card table storage under stair screened by sliding curtain. Minimum partitions—separating dining from kitchen.

Kitchen and utility arrangement standard with that of Plan 1.



PLAN. SECOND FLOOR. All wardrobes standard with those of Plan 1.

Sleeping and dressing arrangement standard with Plan 1.

All rooms have southern exposure.



FOUNDATIONS FOR THE LOW-INCOME HOUSE

By **SHELDON D. WERNER**

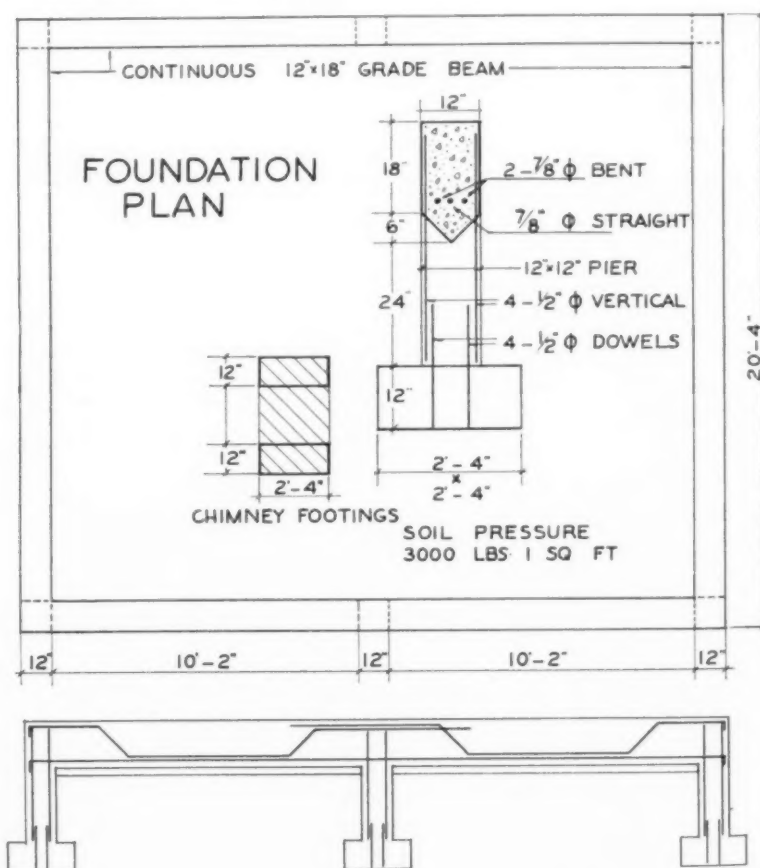
Consulting Engineer

Three kinds of foundations are considered as suited to the low-cost house.

THE PURPOSES OF FOOTINGS FOR A DURABLE AND WELL-CONSTRUCTED HOUSE ARE:

- Capability of safely supporting superimposed load.
- Freedom from movement due to soil conditions and frost action.
- There should be no disintegration from weather and changing temperature.
- No waste of material and labor for installation.
- Depth suited to locality (soil conditions, temperature).
- Protection against termites and rot.
- Waterproofing of foundation to prevent passage of moisture to cellar or vertically to house framing.

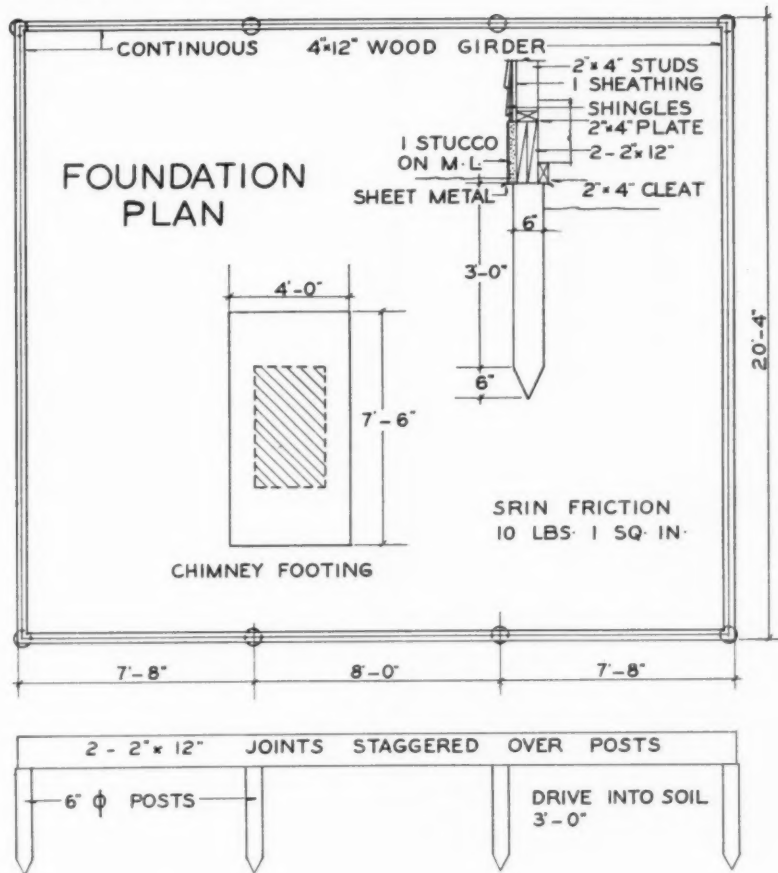
A MASONRY HOUSE



A CONCRETE BEAM AND PIER FOUNDATION—REINFORCED.

A frostproof foundation for use in severe northern climates, including Alaska. Will comply with any building code. This design results in minimum excavation and maximum stability and economy of material. Use in localities where material is expensive and labor is cheap. Foundation cost for pier and beam type, reinforced, \$236, including rough first floor construction. A concrete block foundation, 2'6" deep, would cost \$170, including rough first floor construction. A concrete block foundation, 5' deep, would cost \$267.

B WOOD HOUSE

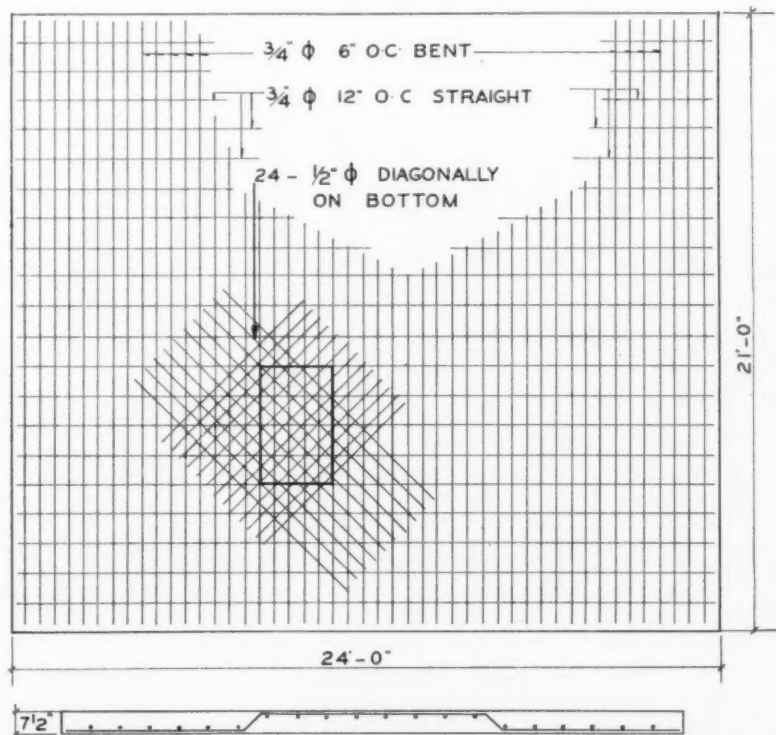


B WOOD POST AND WOOD GIRDER FOUNDATION.

The most economical foundation possible for the same house built in conventional wood framing and finish. Suitable for southern climate and where building codes do not specify foundation construction. Precaution must be taken against termites and rotting of wood. "Woods combining decay-resistance in a high degree are: black locust, Osage orange, chestnut, cedar, cypress, heart of redwood."* All woods, regardless of species, should be given a good preservative treatment. Use copper discs, projecting 2" beyond all posts, for termite protection.

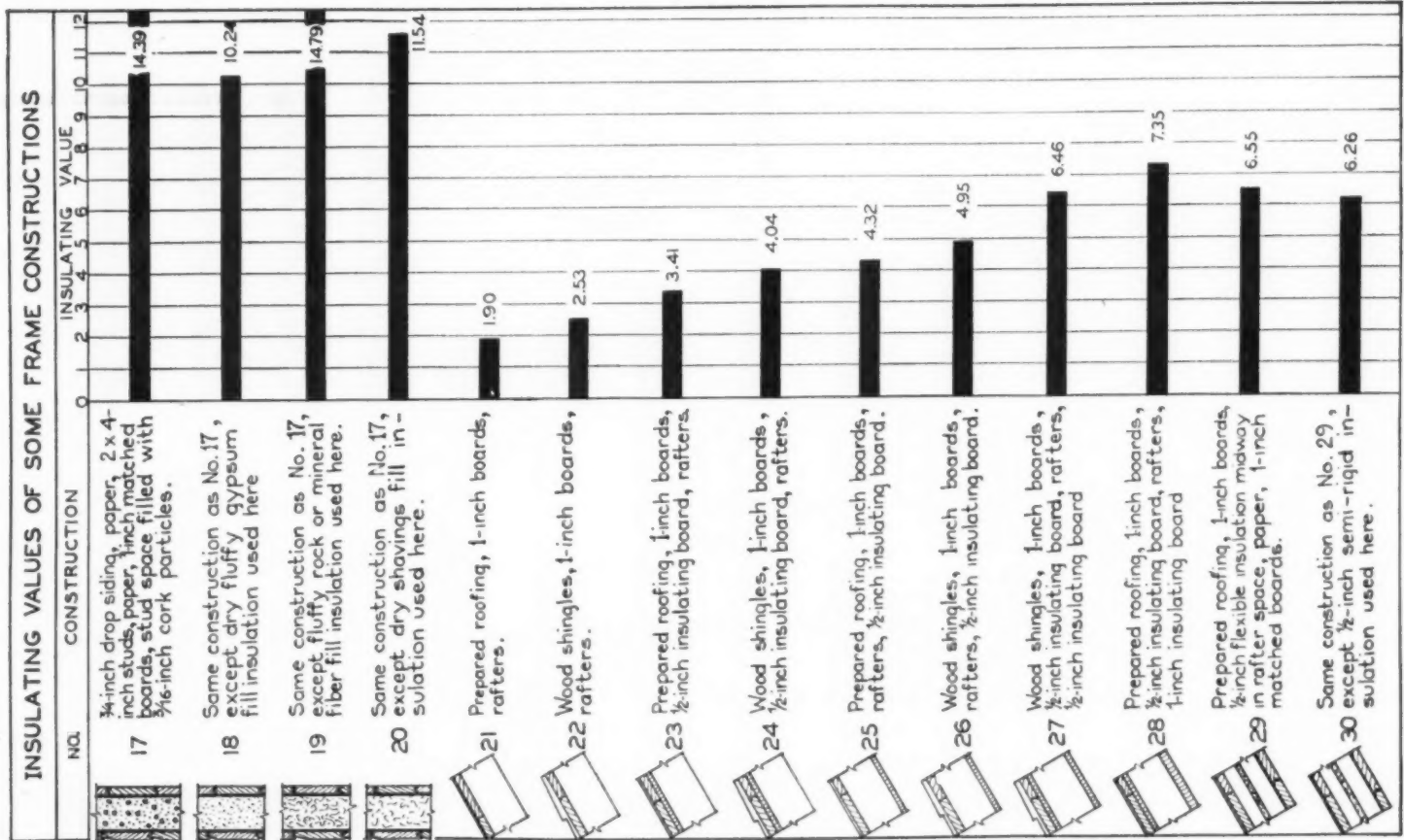
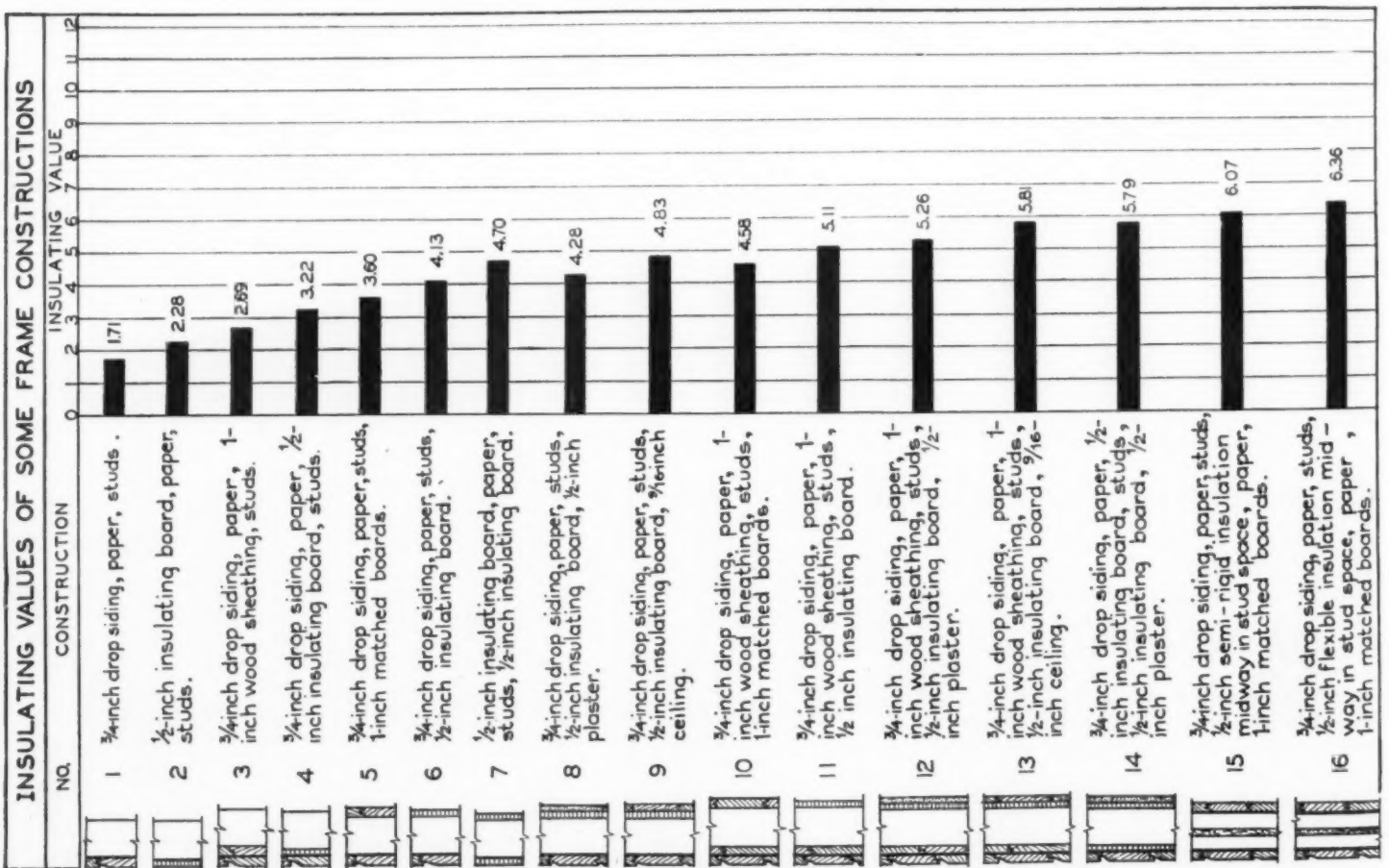
*Forest Products Laboratory Recommendation.

C MASONRY HOUSE



C REINFORCED CONCRETE SLAB, OR MAT FOUNDATION.

Of sufficient rigidity to insure movement of the entire structure as a unit. For use only on level land with uniform soil condition in any climate. Note that heater room floor must be raised to general level. Heat loss to earth would be objectionable in severe climate. Can be built very economically by experienced contractor. Movement of structure is negligible. Would be greatly lightened for same house in frame construction. Mat foundation as detailed would cost \$177. All prices are based on employment of union labor in New York metropolitan area.



INSULATION FOR THE LOW-COST HOUSE

ECONOMY OF INSULATION

In considering the cost of insulation one must take into account added comfort, both in summer and in winter.

There is also the initial saving in heating plant installation and radiators (hot-water and steam). This saving has been estimated as \$12 to \$20 for the typical house of 10,000 cubic feet. Fuel saving per year may be estimated as ranging from 2 to 3 tons per year or, in dollars and cents, from \$20 to \$30 saving each year.

With some types of construction the cost of insulation can be partly and even entirely saved, as with structural insulation (rigid insulation board) which, because of its rigidity, can be used as a combination insulating and structural material, such as for sheathing under shingles or clapboards, as a plaster base, or for internal finish of walls and ceilings. Here it often takes the place of a more expensive facing or structural material and at the same time offers good insulation.

"In winter insulation acts to keep heat inside buildings, and in summer to keep it outside."

The term "insulation" is commonly applied to those materials which have a *high degree* of heat-resisting ability, such as are manufactured for this express purpose.

Lightweight building materials containing innumerable small spaces are usually better insulators than are products or walls having a few large air spaces; they are also better insulators than are dense solid materials. Exception is cited in the case of thin sheets of polished metal, the bright surfaces of which reflect heat just as a mirror reflects light.*

MANUFACTURED INSULATION

1. **Rigid Insulation.** Insulation board manufactured chiefly from vegetable fiber (plant and wood fiber). It is produced in panels of various sizes and may be sawed and nailed. It may be used solely for insulating values, although because of its rigidity it is generally used as a combination insulating and structural material, such as outside sheathing, plaster base, or interior finish for walls and ceiling.

Standard sizes are 4 feet wide by 6, 7, 8, 9, 10 and 12 feet long. Common thicknesses are approximately $\frac{1}{2}$, $\frac{3}{4}$ and 1 inch.

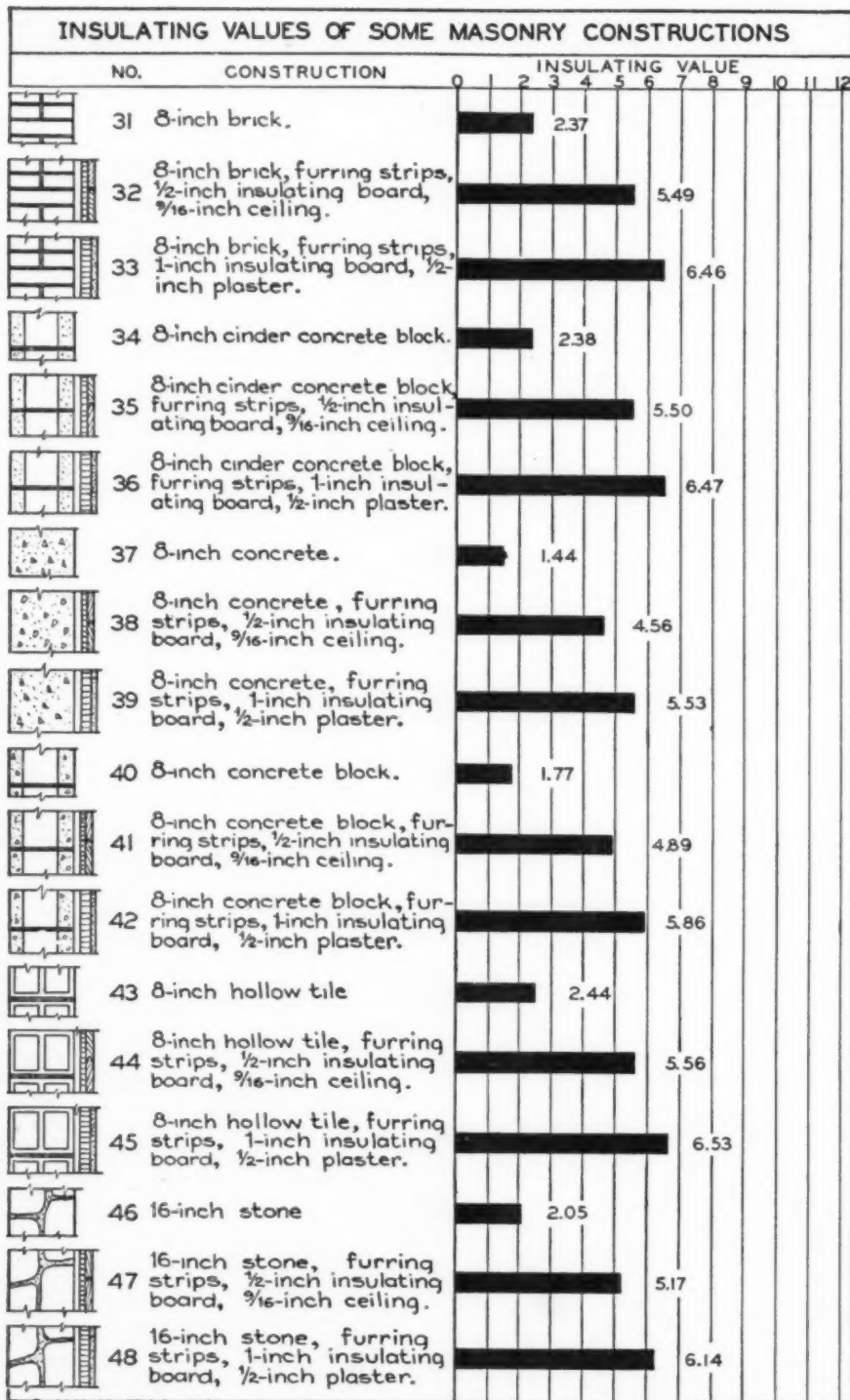
Rigid insulation of the non-structural type is made from the same fibrous materials as structural insulation and from cork. This is usually sold for "roof insulation" and is not intended for use where strength is needed in excess of that required to withstand handling. Corrugated fiberboard is another material of this general type.

2. **Semi-rigid Insulation.** Panels of semi-rigid insulation, sometimes called "felts," are less rigid in form than board insulation and possess a certain degree of flexibility. These materials are usually made from vegetable fiber such as flax and various grasses. In addition to their application in walls and roofs, they are used to wrap around ventilating flues.

Semi-rigid insulation is manufactured in sheets ranging from $\frac{5}{16}$ inch to 1 inch in thickness; in widths of $16\frac{1}{2}$, $24\frac{1}{2}$, 32 and 36 inches; and in lengths of 8, $8\frac{1}{2}$, 9, $9\frac{1}{2}$ and 10 feet.

3. **Flexible Insulation.** Flexible insulation material consists of a loosely felted mat of wood fiber, hair, grass, Kapok, or mineral substance, usually covered on both sides with a layer of paper or fabric. It is sometimes called "blanket" and "quilt" insulation. This material is used only for its insulating properties. Its light weight and loosely matted form make it suitable for packing cracks around openings, wrapping pipes and ducts. It comes in sizes suitable for insertion between wall studs and

*Report of sub-committee on insulation. Twenty-fifth report of the National Committee on Wood Utilization. 1933. P. 2.



other framing members, and for application over the edges of these members.

Flexible insulation is produced in strips approximately 17, 25, 33 and 48 inches wide and in lengths up to 100 feet. Thicknesses, 1/4 inch to 2 inches.

4. **Fill Insulation.** Fill insulation is granulated, shredded, or powdered material. Products commonly used are granulated cork, shredded vegetable fiber and powdered or fibrous minerals, such as gypsum, limestone or other rock and slag from metal refineries. It generally comes in bulk and, as the name implies, is used for filling spaces in wall, floor, ceiling and roof construction.

Fill material may also be obtained in the form of "bats" made by felting mineral fibers into units several inches thick and in widths to fit between studs and other framing members.

AN ANALYSIS OF SEVENTEEN HOUSES

COSTING LESS THAN \$5,000

Materials and equipment that architects and builders have used in actual examples of low-cost houses are not to be accepted as a guide to new work. There is, however, some interest and, perhaps, some value in noting common practice as applied to the house of moderate price. The following chart was prepared by John R. Weber. It is a study of seventeen houses costing less than \$5,000 each, exclusive of land cost. Construction materials and equipment items are separately listed and percentages of use indicated.

	No.	%		No.	%
Foundations			Interior Trim		
Concrete	12	71	Pine	13	77
Concrete Blocks	4	23 $\frac{1}{2}$	Fir	3	17 $\frac{3}{4}$
Stone	1	6	Redwood	1	6
Rough Construction			Insulation		
Steel	1	6	With	10	59
Wood	13	77	Without	7	41 $\frac{1}{4}$
Concrete Blocks	2	11 $\frac{1}{2}$	Wiring		
Brick	1	6	BX	10	59
Exterior Surface			Conduit	1	6
Wood	9	53	Knob and Tube	6	35 $\frac{1}{4}$
Stucco	2 $\frac{1}{2}$	14 $\frac{3}{4}$	Lighting		
Brick	2	11 $\frac{3}{4}$	Direct	15	88 $\frac{1}{4}$
Shingles	1	6	Indirect	2	11 $\frac{3}{4}$
Stone	2	11 $\frac{3}{4}$	Bathroom Fixtures		
Plywood	$\frac{1}{2}$	3	Tub, Toilet, Basin	11	65
Roof			Tub, Shower, 2 Toilets,		
Shingles	8	47	2 Basins	3	17 $\frac{3}{4}$
Slate	2	11 $\frac{3}{4}$	Tub, Shower, Toilet,		
Wood	1	6	Basin	1	6
Tar Paper	4	23 $\frac{1}{2}$	Tub, 2 Toilets, 2 Basins	1	6
Tar and Gravel	2	11 $\frac{3}{4}$	Shower, Toilet, Basin	1	6
Metalwork			Pipes		
Copper	8	47	W. I.	7	41 $\frac{1}{2}$
Galvanized Iron	9	53	Brass	5	29 $\frac{1}{2}$
Door and Window Frames			Copper	3	17 $\frac{3}{4}$
Wood	7	41 $\frac{1}{4}$	Steel	2	11 $\frac{3}{4}$
Steel	10	59	Heating		
Interior Finish			Gas	8	47
Lath and Plaster	9	53	Coal	6	35 $\frac{1}{4}$
Wood	4	23 $\frac{1}{2}$	Oil	3	17 $\frac{3}{4}$
Concrete Blocks	2	11 $\frac{3}{4}$			
Compo. Sheets	2	11 $\frac{3}{4}$			

Two thirds or more of these houses have:

- Concrete foundations
- Wood frame construction
- Pine trim
- Direct lighting
- One bathroom, one tub, etc.

About one-half of these houses have, in addition to the above:

- Wood exterior surface
- Shingle roofs
- Steel casement window frames
- Lath and plaster interiors
- Some kind of insulation
- BX wiring
- Gas heating

COST STUDY¹: FOR A LOW-COST HOUSE FOR

1. Figures based on composite bids: Alan-Lawrence Company, Inc., 301 Madison Avenue, N. Y. C.; Raymond D. Ritchie, 103 Park Avenue, N. Y. C.

Element	Material	Specifications
EXCAVATIONS	Full	Full excavation: 7'-6" in heater room; 6'-6" in remainder.
FOOTINGS	Concrete	1' x 2' concrete: water-cement ratio 6-1: 1/2-3-5 mix.
A. Chimney	Concrete	Extra reinforced mat 1' x 3' x 5': same mix as above.
B. Ext. Steps	Concrete	Concrete: repeat mix: trowelled cement surface.
FOUNDATIONS	A. Concrete Blocks	12" cinder concrete blocks laid in cement mortar.
	1. Waterproofing	1 coat standard brand liquid asphaltic compound.
	B. Reinforced Concrete	8" concrete: repeat mix above.
	C. Brick	12" common brick wall: waterproofed cement mortar.
	Concrete Mat	7" reinforced concrete: same mix as above.
TERMITE PROTECTION	A. Chemical	Sills, plates, studs chemically impregnated under pressure.
	B. Mechanical	Continuous 10-oz. gauge copper band projecting 2" on both sides of all foundation walls.
CHIMNEY	A. Brick	Common brick in cement mortar: T.C. flue linings: firebrick backing in fireplace.
FLOORS		
A. Construction	A. Wood	
	1st Floor	3" x 10" joist: 16" o.c.: cross bridging: 7/8" x 6" diagonal sheathing.
	2d Floor	2" x 8" joist: 16" o. c.: cross bridging: 7/8" x 6" diagonal sheathing.
	B. Metal	
	1st and 2nd Floors	*Cellular Steel: cinder concrete fill: ready for finish floor.
	C. Concrete	
	1. Heater Room	4" concrete: wire mesh reinforcing: trowelled cement finish.
	2. 1st Floor	5" reinforced slab: repeat mix: structural steel included.
B. Finish	A. Linoleum	Medium gauge plain linoleum: laid in mastic on unimpregnated felt.
	B. Wood	No. 2 common P.S. oak flooring: sanded and finished.
EXTERIOR WALLS	A. Wood: Framing	2" x 4" studs braced at corners and openings: heavy building paper and 7/8" diagonal sheathing.
	1. Flush Siding	6" T & G siding: select grade.
	2. Brick Veneer	4" common brick tied to walls framed as above.
	B. Concrete Block with Stucco	4" cinder concrete block tied to walls as above: sand-finished, waterproofed cement plaster finish.
INTERIOR PARTITIONS		
A. Framing	A. Wood Studs	2" x 4" studs, braced and doubled at openings.
	1. Wall Board	1/8" standard smooth finish wall board: battens at joints or joints pointed.
B. Finish	B. Plaster on Wood Lath	3/4" plaster, smooth finish: on wood lath.
		3/4" plaster on expanded metal lath. (See alternate under Insulation.)
ROOF	A. Framing	2" x 8" rafters, 16" o.c.: bridging: 7/8" x 6" sheathing.
	B. Finish and Flashing	20-year built-up roof: 5-ply, felt, asphalt, slag: 16-oz. copper flashing on parapet: plastic slate mastic.
STAIRS	A. First Flight	Rough pine framing: milled treads, risers, rail.
	Second Flight	Rough pine framing: oak treads, risers, rail.
DOORS AND WINDOWS		
A. Doors	Wood	Stock 1 3/4" single panel fir: installed, with hardware.
B. Windows	A. Steel Casement	Standard steel casements: complete with hardware, glazed and installed.
	B. Wood D-H Sash	Stock wood D-H sash: glazed, installed, with hardware.
INSULATION	A. Exterior Walls and Roof	
	1. Rock Wool	4" mineral wool bats: all exterior walls and roof.
	2. Lath	**Aluminum-backed metal lath (for insulation against radiant heat).
	B. Weather-stripping	
	1. Doors	Weather-stripping and bronze threshold: installed.
	2. D-H Wood Sash	Standard weather-stripping on all sash.
MILLWORK	Trim, Base, etc.	Stock pine trim, base, closet equipment: installed.
PAINTING		3-coat lead-and-oil job on exterior and interior trim, sash, doors, etc.: exterior stained: interior painted with cold-water cement paint.
TOTAL COST	Structure only.	

* Prices based on FK-type cellular steel as manufactured by H. H. Robertson, Inc. Labor included.

** Prices based on Reynolds Metallated Ecod Fabric Lath: New York area, labor included.

A FAMILY OF FOUR

Base 2	Alternate "A"	Alternate "B"
\$93.00		
73.40		
3.00		
18.00		
177.50		
30.15		
	+ \$114.00	
- 200.05		+ \$125.60
15.00		
	+ 35.85	
238.00		
92.08		
82.22		
	+ 174.30	
34.00		+ 260.10
143.80		
	+ 12.30	
205.50		
249.00		+ 586.00
	+ 81.00	
49.56		
226.68		
	+ 95.46	+ 111.26
118.00		
91.04		
50.00		
75.00		
159.00		
120.00		
	+ 33.00	
180.00		
+ 100.00		
18.00		
	+ 30.00	
115.00		
150.00		
\$2,806.93		

2. All cost items include labor at union wages for New York area.



Plan of house for which construction costs were obtained.

The present study is an attempt to present the possibilities of building, in the immediate present, a house for the average American family of four persons: to demonstrate that within certain minimums in terms of comfort, utility, and sanitation this house can be built and equipped for \$4,000.

To facilitate this analysis costs were broken down into the following categories:

1. Structure.
2. Mechanical equipment.
3. Electrical system.
4. Furnishings.

The structure was then broken down into its component elements and each of these elements analyzed on the basis of (1) conformity to structural criteria and (2) cost. To achieve the cost data it was necessary to definitely locate the house in the New York area; bids were secured on the above plans and these bids were then analyzed and tabulated. The resulting base price and alternates are classified *solely on a basis of cost*. On this basis it was possible to demonstrate factually the materials and methods available to the individual builder of the low-cost house.

It should be borne in mind that these prices are only quoted because of the premises of this survey: a \$4,000 house for a family of four. The consideration of various materials and construction methods has been conditioned by price, not mechanical value. It has thus been necessary to exclude many, indeed most, of the market's newest and best developments. And it should be remembered that these prices are valuable only as *ratios*, both in relation to each other and in relation to similar projects elsewhere in the country. For the cost of this identical structure will vary widely on two counts:

1. Differentials in labor and material prices.
2. Differentials in structural and mechanical requirements for the various regions.

A study of the cost figures of this house clearly reveals that traditional structural methods remain the cheapest, and wood the cheapest structural material.

It is perhaps even more important to notice how closely fireproof—and, in some cases, preassembled—elements are pressing upon traditional non-fireproof construction. Thus, for \$255 additional, exterior wall construction could be changed from 6" frame to 4" cinder concrete with cement stucco finish backed up by 4" wood construction with mineral wool insulation; and for wood framing on the first and second floors cellular steel construction could be substituted. The resulting structure would thus be much more permanent, highly fire- and termite-proof.

Again, in warm climates, where soil conditions are even and topography level, a reinforced concrete mat of sufficient rigidity to insure movement of entire structure *would reduce the base price \$302.05!* (This economy, of course, comes from the omission of excavations, footings, foundations and first floor construction.)

There are, of course, many further economies to be had from such minor elements as door and window units complete with frame, trim and hardware; prefabricated closets, and rationalization of finished carpentry, painting, etc. But the use of most of these devices is not yet general enough to permit cost studies.

SPACE-SAVING ARRANGEMENTS

FOR KITCHEN, BATH AND UTILITY ROOM

Typical plans suggested for the low-cost house by American Radiator & Standard Sanitary Corp.

PLAN 1—A small kitchen with flat rim, built-in counter top sink and a utility room 8'x8' with two-part laundry tray, heating boiler, domestic hot-water heater and space for washing machine, mangle, and the like.

PLAN 2—A complete combination kitchen and utility room 7'6"x9'. The equipment consists of heating boiler, air conditioning unit, domestic hot-water heater, combination sink and laundry trays, gas stove, gas or electric refrigerator, cupboard space and broom closet.

PLAN 3—A long narrow kitchen with utility room 7'x9'. Both rooms contain the same equipment as in Plan 1.

PLAN 4—Kitchen and utility rooms of different proportions than those already described; same equipment with the laundry tray connected back to back against the sink.

PLAN 5—A kitchen 7' x 8' and a utility room 6' x 7' containing the following equipment: combination sink and laundry tray, oil-burning boiler, indirect hot-water heater and storage tank.

PLAN 6—The same arrangement of equipment in approximately the same size rooms, showing a gas-burning boiler and a gas-burning storage hot-water heater.

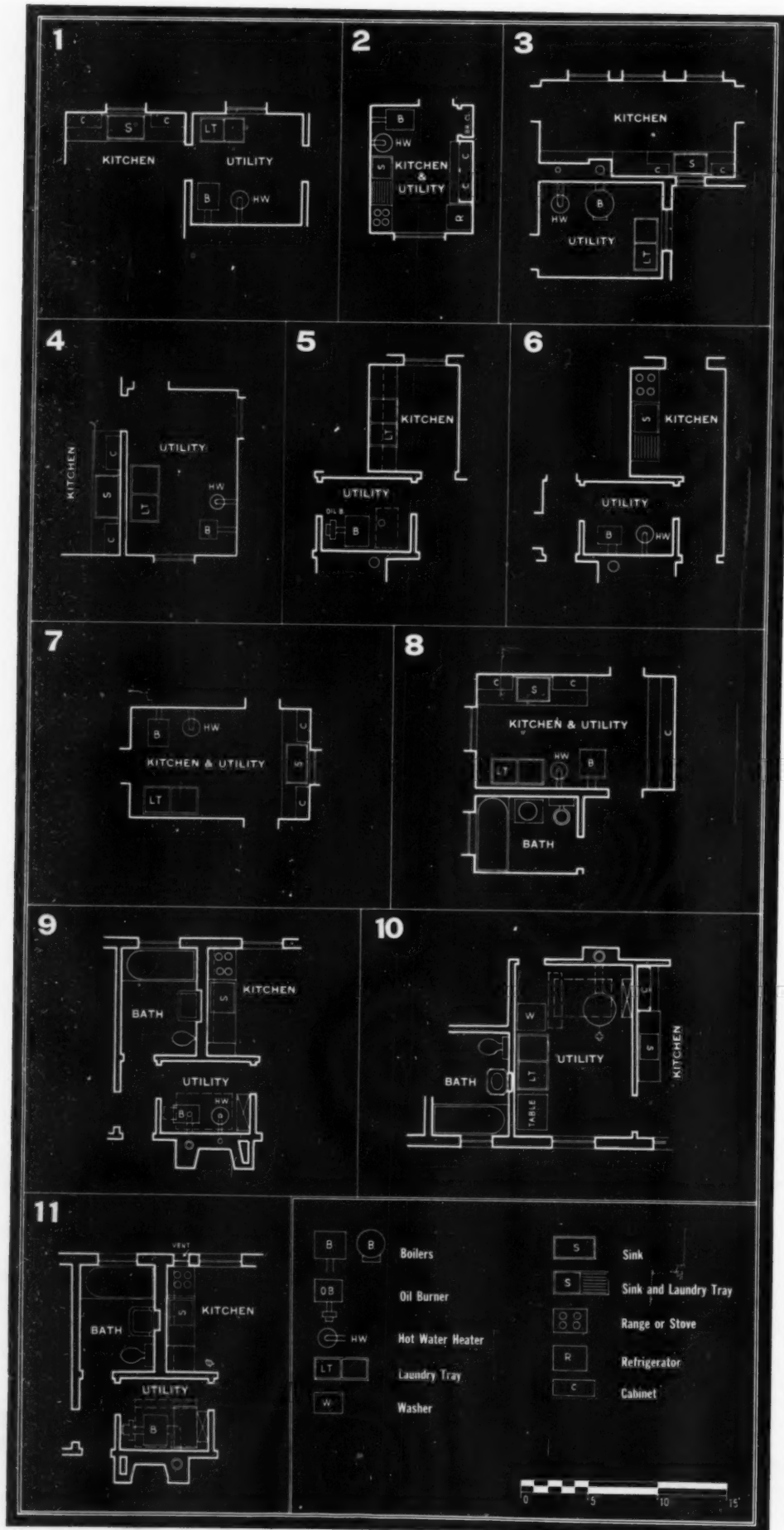
PLAN 7—A kitchen 8' x 13' with all necessary mechanical equipment, including sink, laundry trays, heating boiler, domestic hot-water heater, kitchen cupboards with space for refrigerator and stove.

PLAN 8—A combination kitchen and utility room 8' x 14' and a bathroom 5' x 7'4". Kitchen equipment consists of sink, laundry trays, heating boiler, domestic hot-water heater, cupboards, and so on. Bathroom equipment consists of recessed tub, lavatory and closet combination. The bathroom is backed up by the laundry tray and hot-water heater in the kitchen and utility room.

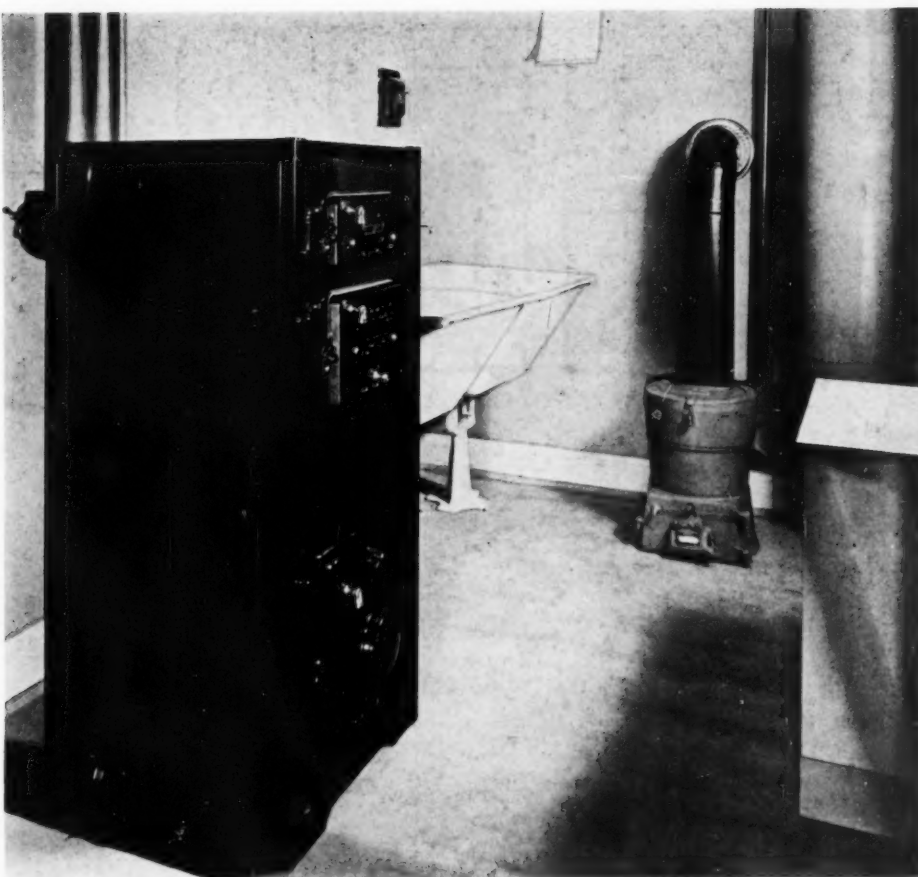
PLAN 9—A complete plan of kitchen, utility room and bathroom, with complete equipment occupying a floor space of 14' x 13'. Kitchen equipment consists of stove, sink and laundry tray, and kitchen cupboards. The utility room has a heating boiler, hot-water heater and air conditioner. The bathroom has tub, lavatory and toilet.

PLAN 10—Another arrangement of Plan 9. The utility room is made large enough for laundry work.

PLAN 11—Identical with Plan 9 with the following exception: Plan 9 is for a gas-fired boiler and domestic hot-water heater; Plan 11 is for an oil-fired boiler and indirect domestic hot-water heater and storage tank.



UTILITY ROOM EQUIPMENT



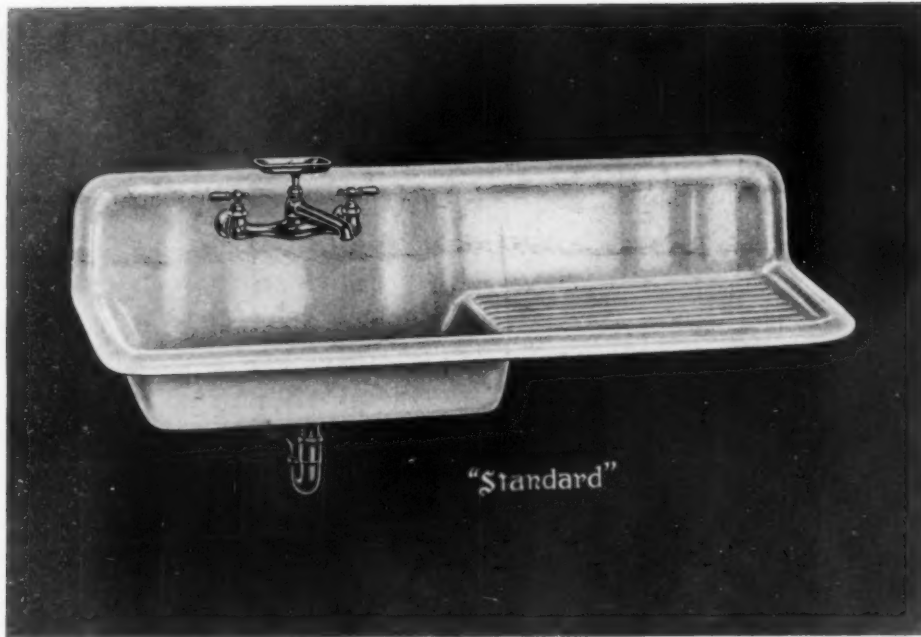
A specially designed boiler for a hot-water radiator heating system for provision of central heating; can be installed in a one-floor home without basement. (All equipment shown on this page produced by American Radiator & Standard Sanitary Corp.)



"Scuttle-A-Day" hot-water supply heater, designed to provide a hot-water supply with low fuel cost; can also be used to heat the house with a warm-water radiator heating system if less than 150 square feet of radiation are required. . . . A gas model boiler for the one-floor warm-water radiator heating system. . . . A specially designed boiler for a hot-water radiator heating system.

A low-cost warm-air furnace for the small house with a basement. . . . A low-cost boiler for radiator heating. . . . Another low-cost boiler for radiator heating.

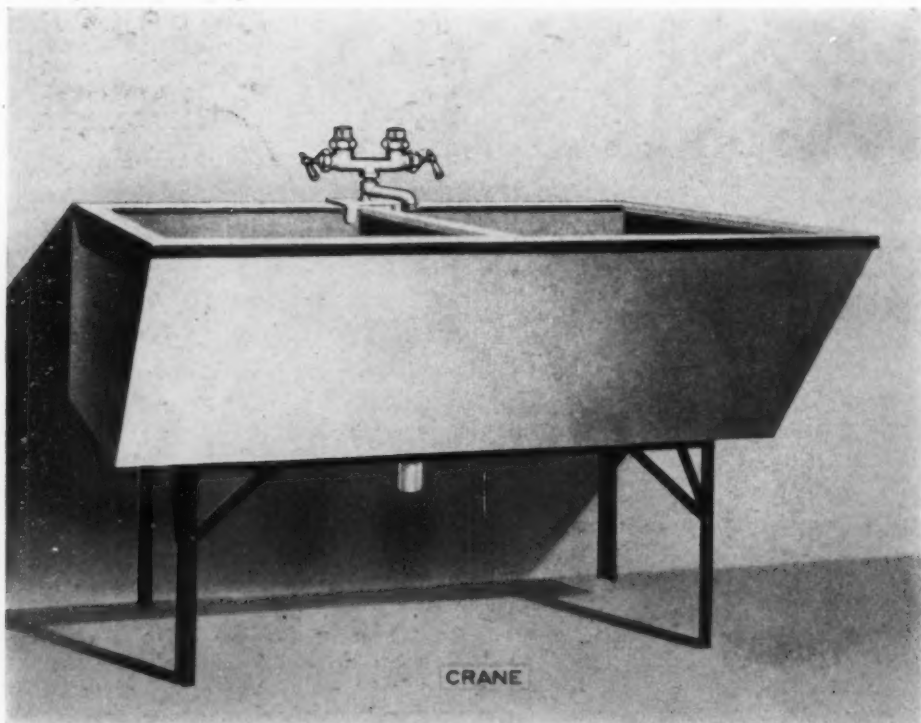
KITCHEN EQUIPMENT



2



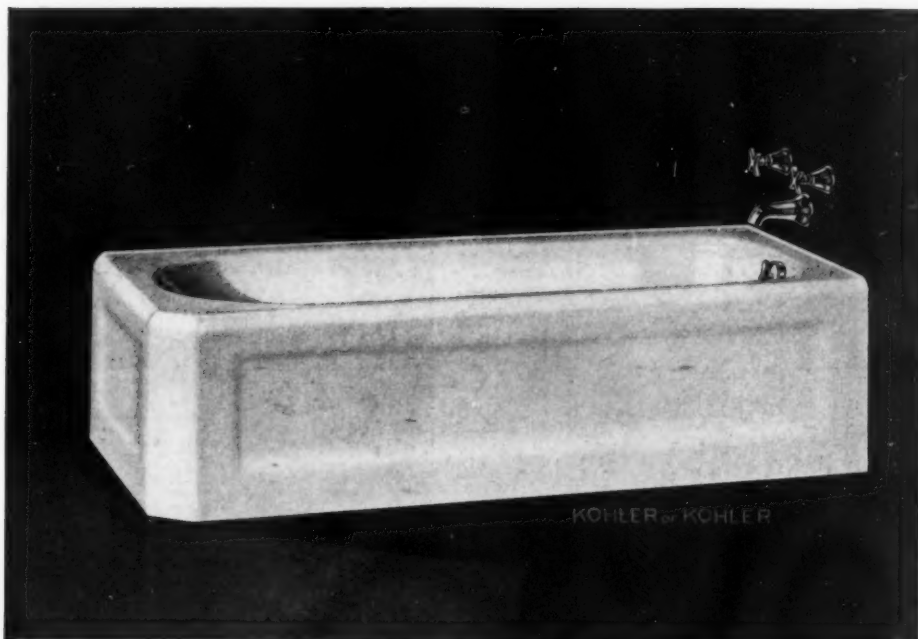
3



4

(1) Simple drain board sink. (2) Kitchen cabinet sink (Briggs Mfg. Co.). (3) Sink and tray combination (Briggs Mfg. Co.). (4) Double compartment cement laundry tray supported on angle-iron frame. Size 42" x 24" (\$19).

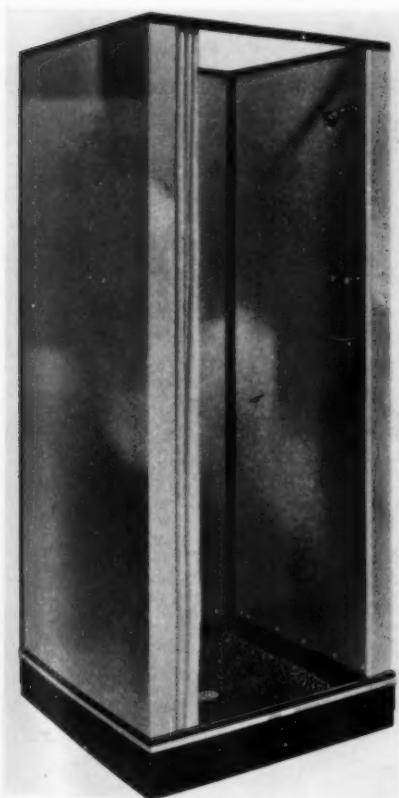
BATHROOM EQUIPMENT



1

(1) Bathtub with 1/2" valves, over-rim supply, pop-up drain (\$59.75). (2) Weisway shower cabinet, size 30" x 30". Painted steel walls, non-slip receptor surface. Pastel green or other colors. Price, fully equipped, \$43.50, plus transportation and installation charges. (Henry Weis Mfg. Co., Elkhart, Ind.). (3) Lavatory with compression faucets, 3/8" supply pipes, drain plug, 1 1/4" P-trap (\$13.50). (4) Specially priced lavatory for a "\$90 bathroom." (5) China syphon jet closet (\$18) and recess bath enameled white porcelain inside, painted outside (\$36).

2



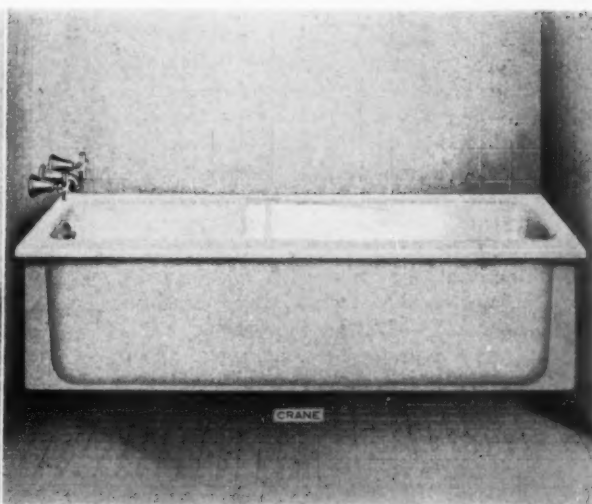
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4



5

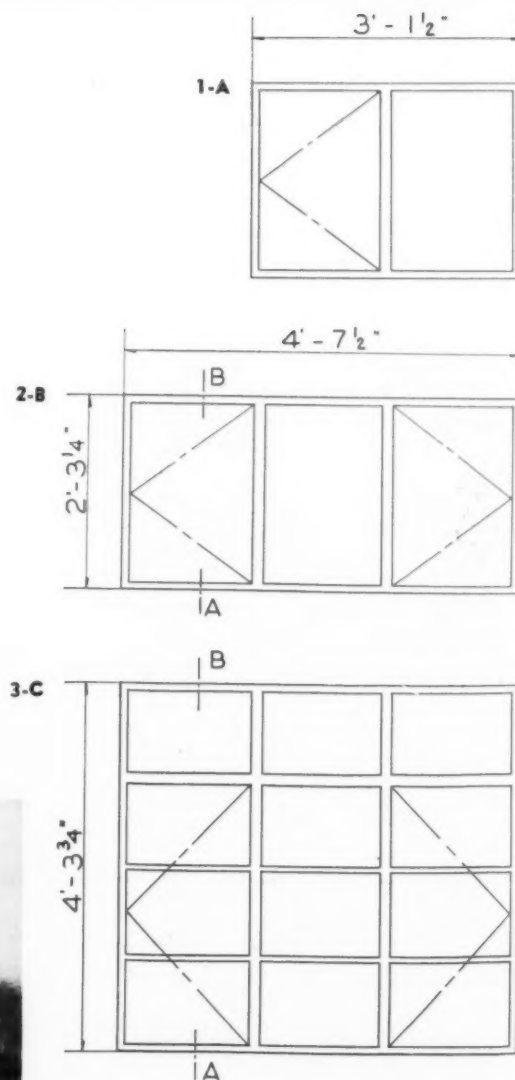
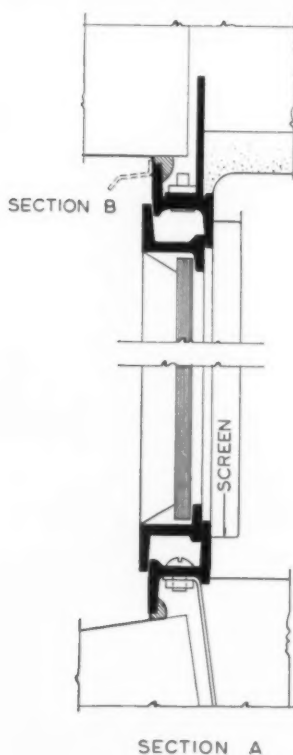


WINDOWS



STEEL CASEMENTS

Steel casement windows cost slightly more than wood windows of double-hung or casement type. Their installation cost is somewhat less. Steel casements come equipped with hardware. Windows 1, 2 and 3 are quoted, delivered without screens in New York City, as follows: (1) A two-light window, \$5.98; (2) a three-light window, \$10.48; (3) three-light high, three units wide, \$12.59. Windows vented as indicated. These windows are standard for almost all steel window manufacturers. Three two-light windows of A type, plus five three-light windows of B type, plus two windows as shown on C type, would cost, in total, \$95.52. These windows are adequate for a house of five rooms. The additional cost for screening all vented windows is \$19.75. Where an order for steel sash for fifty houses is entered at the same time, there is a cost reduction for sash of approximately 20 per cent.



ELECTRIFICATION FOR THE LOW-INCOME HOUSE

By **HENRY L. LOGAN,**
Consulting Electrical Engineer

Considering the total floor area of 1,000 square feet in the low-income house, the proposed electrical system is of a quality and capacity in excess of existing inadequate standards. It meets the minimum requirements of the scientifically electrified home based on proper provision for illumination, work, health, and entertainment (see pages 448-457 of the May 1934 issue). The author believes it is sufficiently ample to protect the owner against electrical obsolescence, and consequently against rapid loss in sales value of the property during the period of the mortgage. See page 90, this issue.

		GROUP (1)	GROUP (2)	GROUP (3)	
REQUIRED LIGHTS					
FRONT DOOR:	Lantern	1	1	1	60 watt
COMBINATION DINING-LIVING ROOM:	Modernized "dome" or	1			200 watt
	Conventional fixture or		3		60 watt each
	Flush ceiling light			1	150 watt
KITCHEN:	Modern kitchen light or	1	1		100 watt
	Flush ceiling light			1	100 watt
STAIRWELL or HALL:	Conventional fixture or	1	1		50 watt
	Flush ceiling light			1	75 watt
BATHROOM:	Bracket or	1	1		40 watt
	Flush ceiling light			1	60 watt
UTILITY ROOM:	Porcelain rosette	1	1	1	40 watt
3 BEDROOMS:	Bracket or	3	3		40 watt each
	Flush ceiling light			3	100 watt each
					Totaling
(1) CONVENTIONAL FIXTURES.....9					610 watts
(2) CONVENTIONAL FIXTURES.....11					590 watts
(3) FLUSH CEILING FIXTURES.....9					785 watts

PORTABLES (See note under "Connected Load: Illumination.")

OUTLETS

CONVENIENCE (Duplex):

Combination dining-living room	3
Kitchen	1
Bedrooms	3
Bathroom	1

CLOCK:

Combination dining-living room	1
--------------------------------	---

WALL SWITCHES:

Front door light	1
Stairwell light (if two stories; otherwise omit)	2

PUSH BUTTON:

Front door	1
------------	---

EQUIPMENT

KITCHEN:

Bell
Refrigerator
Toaster
Coffee maker
Vacuum cleaner

UTILITY ROOM:

Washing machine
Flatiron

BEDROOM:

Warming pad

LIVING ROOM:

Clock
Radio

DISTRIBUTION OF ELECTRICAL OUTLETS BY TYPE

CEILING OUTLETS: 4, 5 or 8, depending on fixture group selected.

BRACKET OUTLETS: 5, 4 or 1, accordingly.

CONVENIENCE OUTLETS: 8

BELL: 1

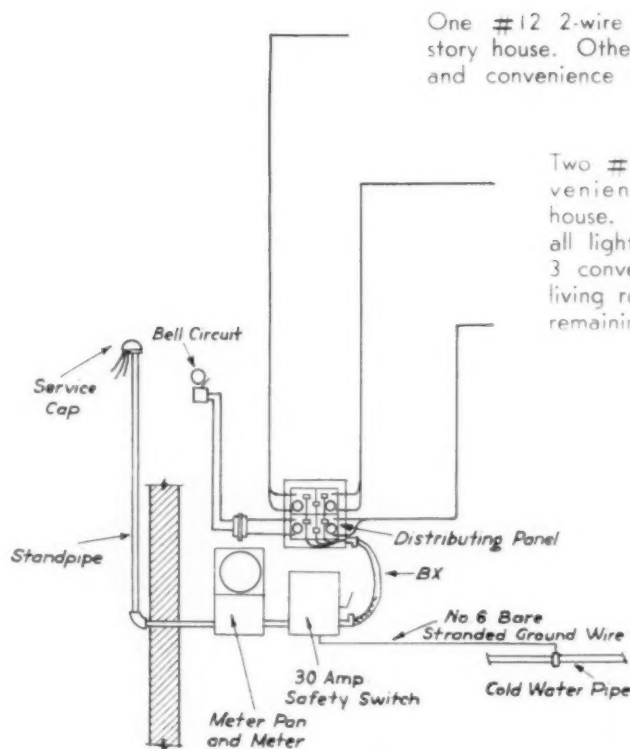
WALL SWITCHES

(Two-way): 1
(Three-way): 2 (omit if not two stories)

CLOCK: 1

22 (if two stories; otherwise 20)

ELECTRICAL DIAGRAM



CONNECTED LOAD

ILLUMINATION:

For floor area of 1,000 square feet, allowing 2 watts a square foot, total ... 2 KW
Fixed lights 590-785 watts
6 portables @ 200 watts each 1,200 "

WORK:

Washing machine 150 watts
Flatiron 660 "
Vacuum cleaner 50 "
Toaster 500 "
Coffee maker 550 "
Refrigerator 75 " ... 2 KW

HEALTH:

Warming pad 75 watts
Bell 2 "
Clock 2 "

ENTERTAINMENT:

Radio 100 watts ... 0.2 KW

TOTAL ... 4.2 KW

WIRING COSTS

\$77.15 to \$84.95

Estimates are based on meeting requirements of the National Electric Code with union labor. In some localities reductions of about 10% can be made by using present standard materials. New cable assemblies and wiring devices are expected to be available shortly that will reduce the quoted costs by approximately \$8.60. Add \$9.60 to each column of figures for two 3-way switches required for hall light in two-story house.

FIXTURE COSTS

\$30.70 to \$34.70

INSTALLATION COSTS

COMPLETE ELECTRICAL COSTS

	FIXTURE GROUP (1)	FIXTURE GROUP (2)	FIXTURE GROUP (3)
Ceiling outlets:	4—\$ 6.60	5—\$ 8.25	*8—\$23.70
Bracket Outlets:	5— 12.75	4— 10.20	1— 2.55
Duplex convenience outlets:	20.40	20.40	20.40
Bell circuit complete:	4.85	4.85	4.85
Clock outlet:	2.55	2.55	2.55
1 single-pole switch:	2.55	2.55	2.55
Distribution panel:	7.35	7.35	7.35
Service (mounting board, switch, meter pan, standpipe):	21.00	21.00	21.00
	\$78.05	\$77.15	\$84.95
FRONT DOOR—Lantern:	\$ 5.00	\$ 5.00	\$ 5.00
COMBINATION DINING-LIVING ROOM—			
Conventional fixture:	11.00	.....	.....
Modernized "dome":	.....	7.00	.....
Flush ceiling light:	.....	.....	4.00
KITCHEN—			
Modern kitchen light:	2.00	2.00	.....
Flush ceiling light:	.....	.....	3.50
STAIRWELL or HALL—			
Conventional fixture:	5.50	5.50	.....
Flush ceiling light:	.....	.....	3.50
BATHROOM—			
Bracket or ceiling light:	2.00	2.00	3.00
UTILITY ROOM—	.25	.25	.25
BEDROOMS—			
Brackets (3):	8.95	8.95	8.95
Flush ceiling lights:	.....	.....	12.00
(1) CONVENTIONAL FIXTURES THROUGHOUT	\$34.70		
(2) CONVENTIONAL FIXTURES and "DOVE"		\$30.70	
(3) BUILT-IN FLUSH LIGHTING			\$31.25
(1) Hanging conventional fixtures	\$9.00		
(2) Hanging conventional fixtures and dining-room "dome"		\$9.00	
(3) Installing flush fixtures			\$12.20
Scheme (1)	\$121.75		
Scheme (2)		\$116.85	
Scheme (3)			\$128.40

* This price is based on using the flush lighting system which requires large work boxes in lieu of standard outlet boxes.

SPECIFICATIONS

SERVICE ENTRANCE MATERIALS: Comply with requirements of local utility.

SERVICE: Overhead.

STANDPIPE: 1-inch electrical metallic tubing, galvanized on outside and enameled on inside, with service cap and all necessary fittings.

ELECTRIC CLOCK OUTLET: G.E. electric wall clock hanger outlet.

METER BOARD: Wood—to take meter pan, main line switch, distribution panel and bell transformer.

SYSTEM: 2-wire, single phase, 110 volt A.C.

SERVICE SWITCH: 20-ampere safety switch similar to No. 1055, Metropolitan Device Corp., Brooklyn, N. Y.

CONVENIENCE OUTLETS: "Spartan" type duplex with bakelite double-edged cover plates.

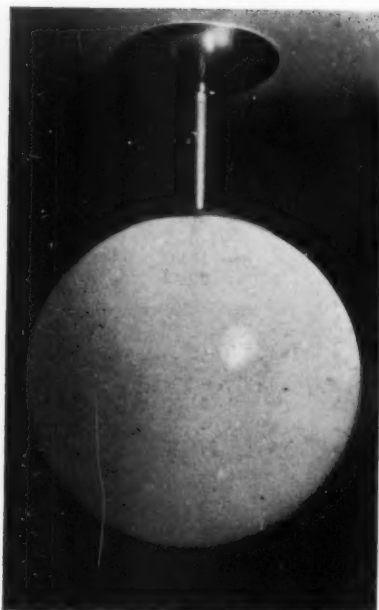
OUTLET BOXES: G.E. octagonal boxes of suitable size, with lugs, mounted on suitable hangers, including rigidly fastened 3/8" male fixture stud. (No outlet boxes required for flush ceiling fixtures; the housing serves as a box.)

SWITCHES: G.E. single-pole flush tumbler switch and, where required, G.E. three-way flush tumbler switches, with textolite plates.

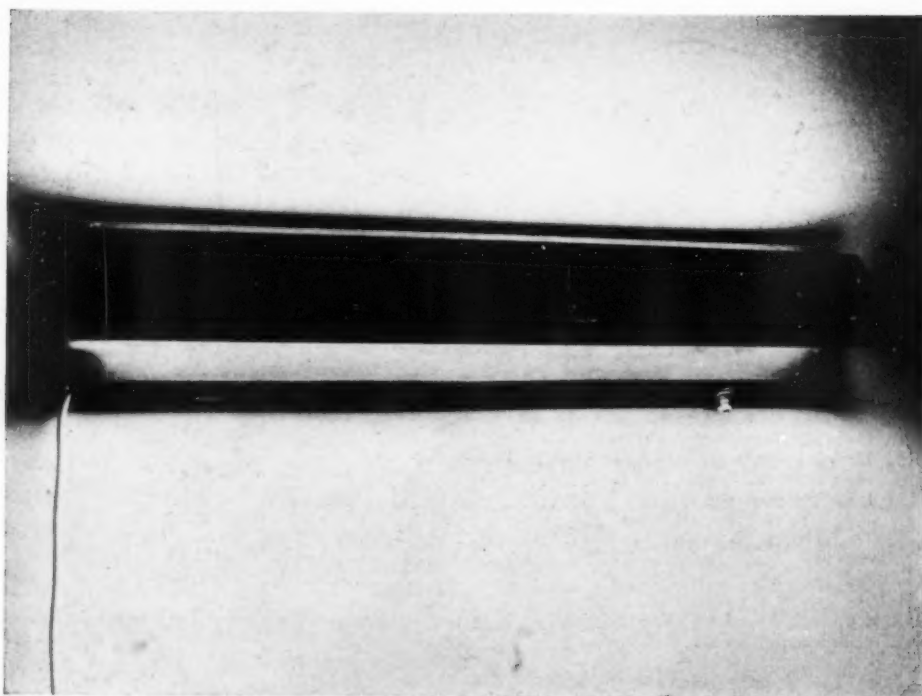
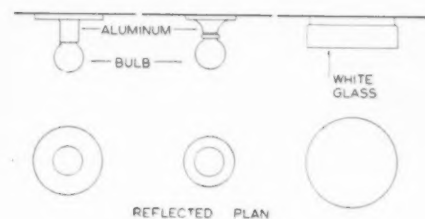
CONDUCTORS: G.E. code grade rubber-covered wire, No. 12 B. & S. gauge, in BX flexible cable; all runs concealed.

DISTRIBUTION PANEL: 4 - circuit type, equipped with 15-ampere cartridge fuses and 25 spares.

BELL CIRCUIT: G.E. rubber-covered fixture wire; Edwards & Co. bell; G.E. transformer, with push button.

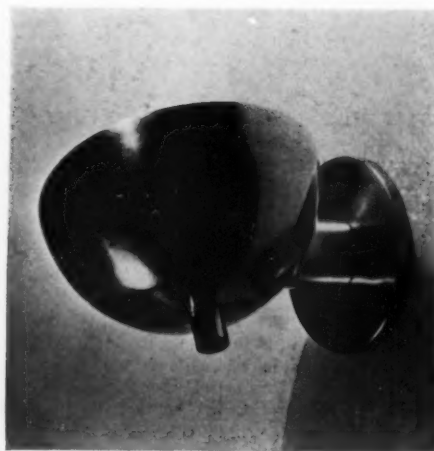
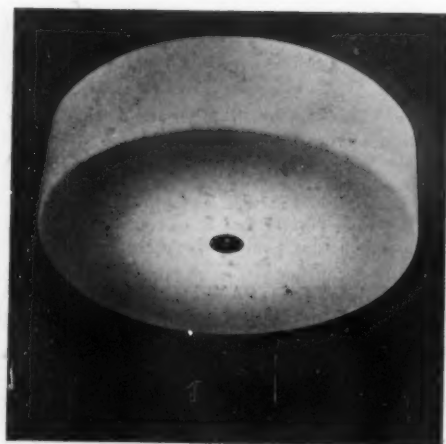


LIGHTING



Top:

Left: Hanging fixture (#120) of polished aluminum finish, opaque glass bowl from 4" to 16" in diameter. Price, \$4-\$6. Renaissance Metal Works, New York City. Right: Ceiling fixture, chromium-plated metal, opaque glass, 10" in diameter. Price, \$1.10. Mail order house.



Center:

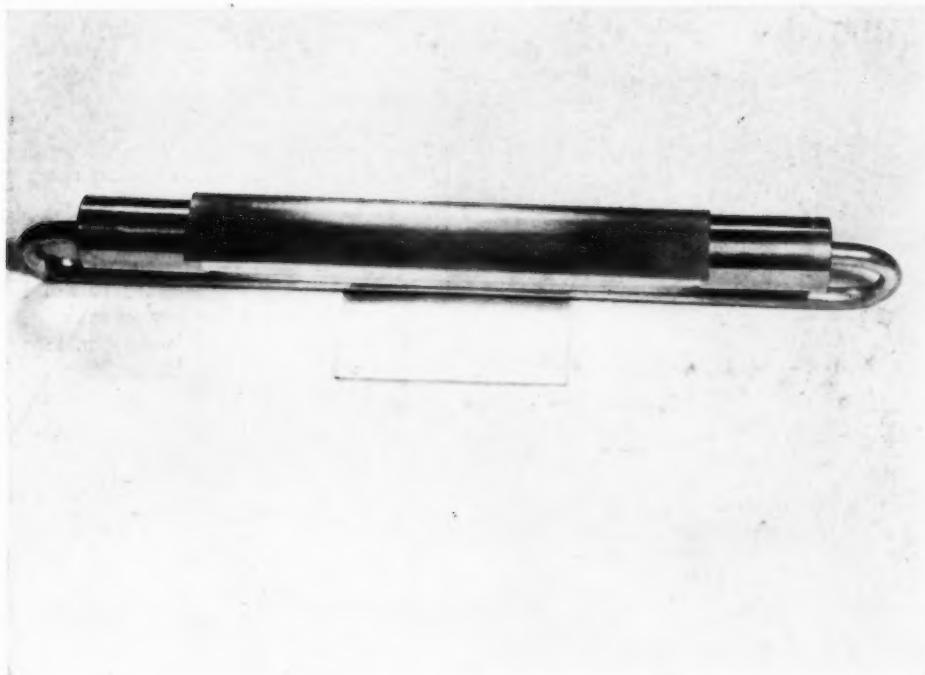
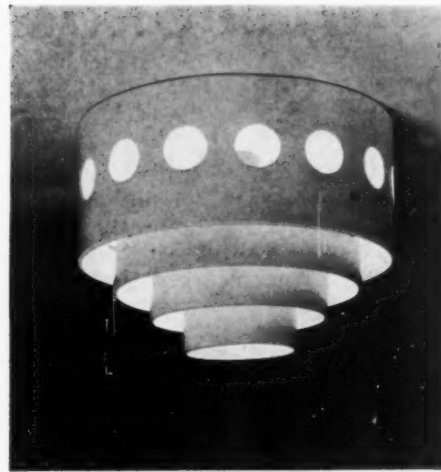
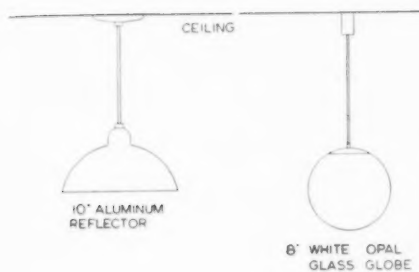
Wall light, dull chromium-finish, adjustable shade 18" in length. Price, \$9.30, including Lumiline lamp. Egli Company, New York City.

Bottom:

Left: Hanging fixture (#125). Polished aluminum finish, opaque glass. Price, \$6.50. Renaissance Metal Works, New York City.

Right: Wall fixture (#122), polished aluminum. Reflector adjustable. Price, \$4. Renaissance Metal Works, New York City.

FIXTURES



Drawings at the tops of these pages are designs by Kurt Versen for the house of moderate cost.

Top:

Ceiling fixture, enameled finish, 12" outside diameter. Price, \$6.80. Egli Company, New York City.

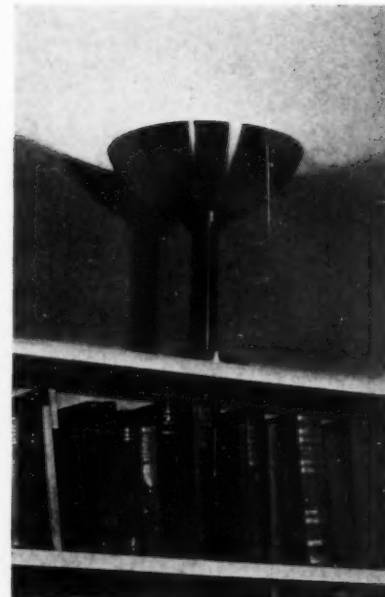
Center:

Wall fixture (#124), polished aluminum finish. Price, \$7.50. Renaissance Metal Works, New York City.

Bottom:

Left: Adjustable desk lamp, black finish. Reflector, adjustable, 13" in length, taking 12" Lumiline lamp. Price, \$6.50. Egli Company, New York City.

Right: Indirect shelf lamp of polished aluminum, 14" bowl. Price, \$11.40. Egli Company, New York City.



Photographs by Zimmerman

HOW ECONOMICALLY CAN I FURNISH A LOW-COST HOUSE?

The following list was prepared by Helen S. Holbrook, Household Equipment Specialist, U. S. Bureau of Home Economics, as a suggested list of furniture and furnishings for the different rooms of a 5-room house: at a cost of \$250.

LIVING-DINING ROOM FURNITURE

- 1 studio couch with 3 pillows (guest bed in case of need)
- 1 bookcase
- 1 table desk
- 1 desk chair
- 2 comfortable chairs
- 1 floor lamp
- 1 table lamp
- 1 waste basket
- 1 card table
- 1 rug, 9 x 12
- 5 pr. curtains
- 1 dining table
- 4 straight chairs (unfinished: varnish for finishing same)

KITCHEN

- 2 pr. curtains
- 1 gas stove
- 1 ice refrigerator
- 1 stepladder stool
- 1 waste basket
- 1 garbage can
- 1 chair (like dining room chairs)

UTILITY ROOM

- 1 table
- 1 ironing board (if not built in)
- 1 folding drying rack
- 1 laundry basket on legs
- 1 copper boiler
- 1 chair (like dining room chairs)
- 2 pr. curtains

PARENTS' BEDROOM

- 2 pr. curtains
- 1 double bed
- 1 mattress for bed, 54" wide
- 2 pillows
- 1 arm chair (straight)
- 1 comfortable chair (unfinished and varnished at home)
- 1 dresser with mirror
- 1 waste basket
- 4 rag rugs

DAUGHTER'S ROOM

- 1 pr. curtains
- 1 army cot, 30" wide
- 1 mattress with inner springs
- 1 pillow
- 1 dresser with mirror
- 1 comfortable chair (as in parents' room)
- 1 rag rug
- 1 waste basket

SON'S BEDROOM

- 1 pr. curtains
- 1 army cot, 30" wide
- 1 mattress, 30" wide
- 1 pillow
- 1 chest of drawers
- 1 mirror
- 1 straight chair (like dining room chairs)
- 1 rag rug
- 1 waste basket

FURNITURE



ZIMMERMAN

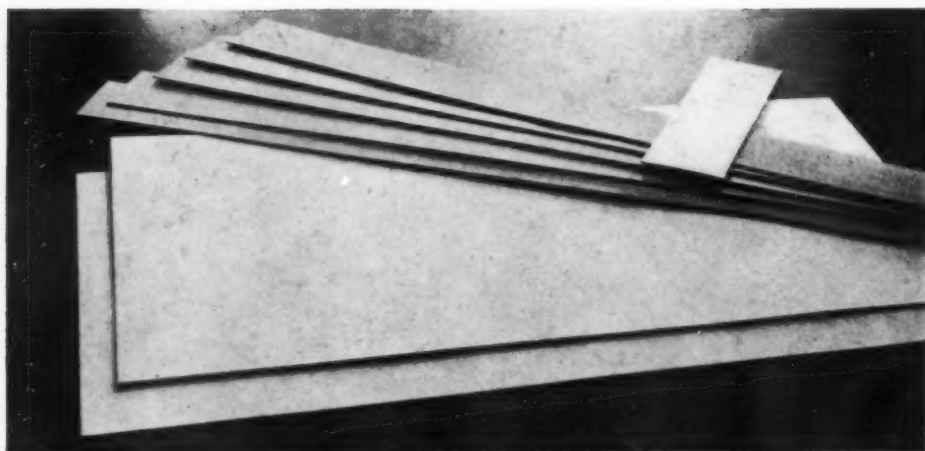
Top: Left—Armchair (No. 524F). Hardwood finish, upholstered seat. Price, \$13.50. Thonet Brothers, Inc., New York City. Right—Side chair (No. 524). Similar finish and upholstery. Price, \$9. Thonet Brothers, Inc., New York City. **Center:** Left—Side chair (No. 462). Fabrikoid seat. Price, \$6.25. Thonet Brothers, Inc., New York City. Right—Utility chair, unfinished. Price, \$2. Department store. **Bottom:** Bentwood side chairs (No. 18-253). Cane seat, \$4.50. Wood seat (No. 18-254), \$4. Thonet Brothers, Inc., New York City.

Furniture and fabrics illustrated in this issue were selected by John R. Weber, designer.

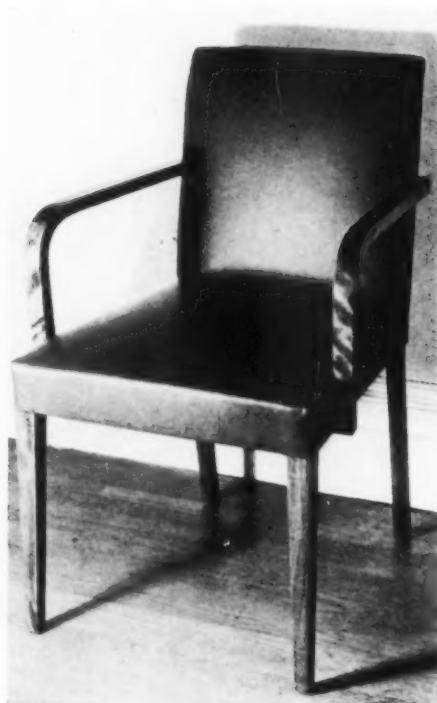
The prices for furniture illustrated in this portfolio are retail or list prices based on the purchase of a single item.



LOW-COST



ZIMMERMAN

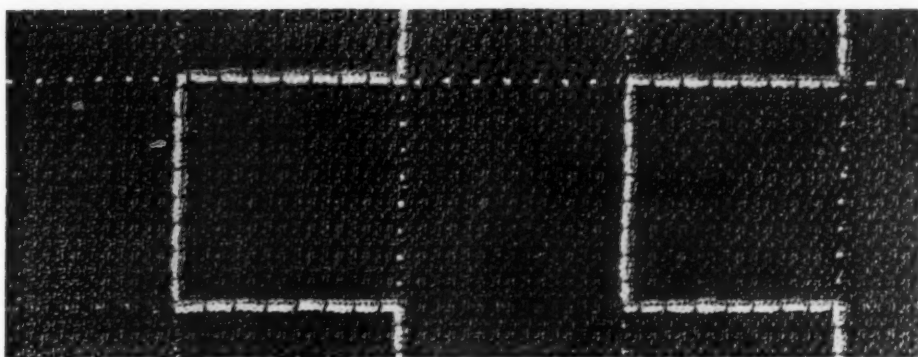


ZIMMERMAN



CENTER: Left—Side chair. Width, 19"; depth, 18"; over-all height, 34". Wood frame, Fabrikoid covering in blue or other colors; also cotton fabrics. Price, \$7.50. A. Bronson, New York City. Right—Armchair. Width, 30"; depth, 20"; over-all height, 34". Wood frame, Fabrikoid covering in blue and other colors. Also available in other fabrics. Price, \$9. A. Bronson, New York City. **BOTTOM:** Left—Side chair (No. 368). Cane back, upholstered seat, hardwood finish. Price, \$11.25. Thonet Brothers, Inc., New York City. Right: Armchair (No. 668). Slightly larger size. Price, \$16.50. Thonet Brothers, Inc., New York City.

T FURNITURE



LINCOLN



ZIMMERMAN



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TOP: Upholstery material for chairs (design No. 84871), cotton weave, 50" wide. Red rust ground, white and brown design. Price, \$1.50 per yard. F. Schumacher & Company, New York City. **CENTER:** Left—Arm chair (No. 4061). Walnut finish, fabric covering. Price, \$6.50. Statesville Chair Company, Statesville, N. C. Right—Sleeping arm chair (No. 474-38). Width, 24½"; depth, 21"; height over-all, 34". Walnut finish, fabric covering. Price, \$17.50. Phoenix Chair Company, Sheboygan, Wisconsin. **BOTTOM:** Dinette chairs (No. 2315). Maple finish, chenille upholstery. Price, \$7.50. Brown Brothers, Gardner, Mass.

LOW-COST



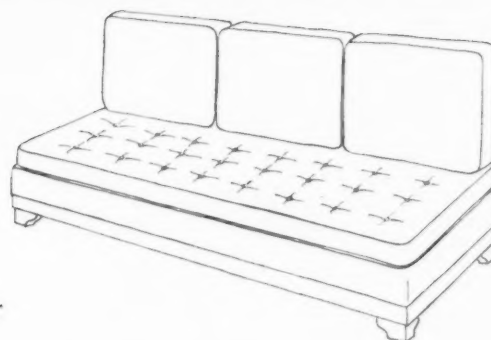
LINCOLN

Top: Dining table and chairs. Chicago Workshops, Inc. **Bottom:** Folding card table and folding chairs. Waterproof upholstery. Price, \$8. Samson Brothers, Detroit, Michigan. Rug, woven cotton, comes in 6' widths. Size shown, approximately 12 x 15.

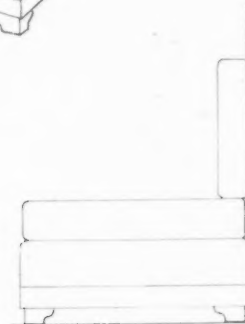
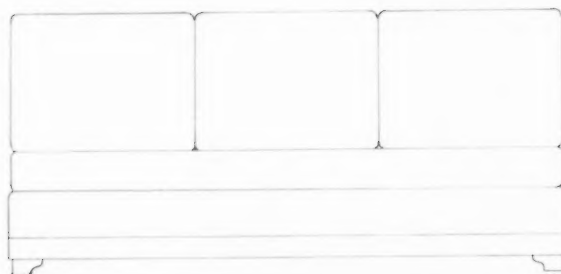
FURNITURE



SEWARD

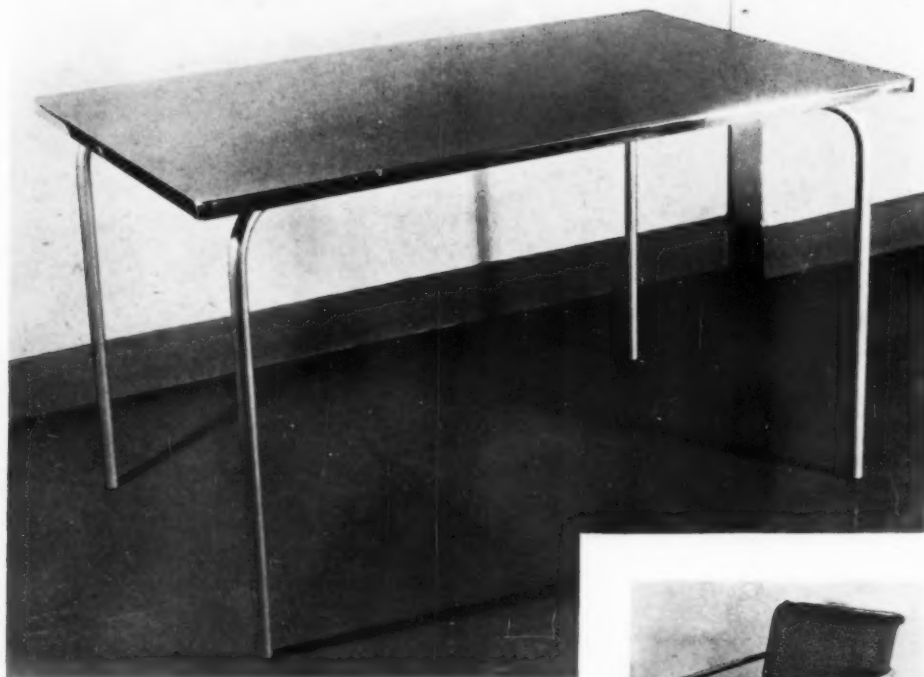


STUDIO COUCH 30" x 72"



Top: Dining alcove in living room of a low-cost house. Leonie Pilewski, designer.
Center: Studio couch (double bed), maple base, steel skeleton. Plaid covering in brown, rust or green. Width, 30"; length, 72". Price, \$27.50. Mail Order House.
Bottom: Arrangement of living room with moderate-cost furniture. Chicago Workshops, Inc.

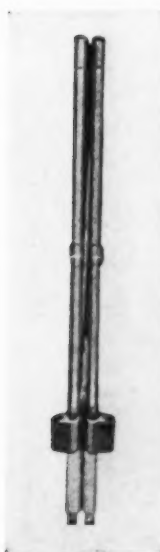
LOW-COST F



FOR LIVING-DINING ROOM

Top: Living room or dining table (No. 88). Width, 30"; length, 48". Black Permite top (alcohol- and burn-proof), chrome base. Price, \$28. Silver-finished base, \$24. Troy Sunshade Company, Troy, Ohio. **Center:** Arm chair (No. 1508). Fiber or fabric covering. Chrome finish, \$16; enamel finish, \$12. Hampden Specialty Products, Inc., Springfield, Mass. **Bottom:** Spring base armchair (No. 84). Width, 20½"; depth, 19". Chromium-finished base, imitation leather covering. Price, \$23. Troy Sunshade Company, Troy, Ohio.

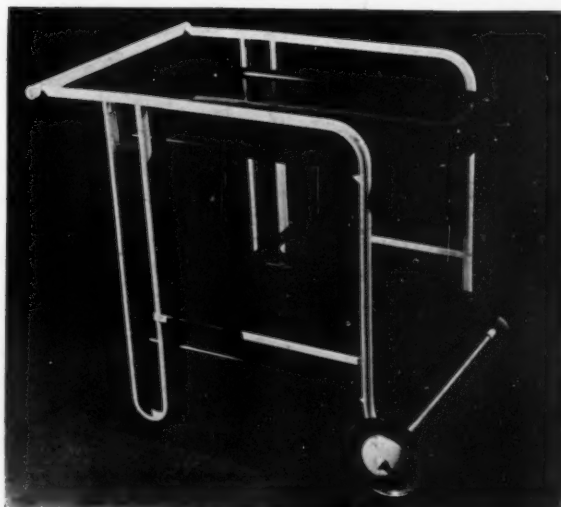
T FURNITURE



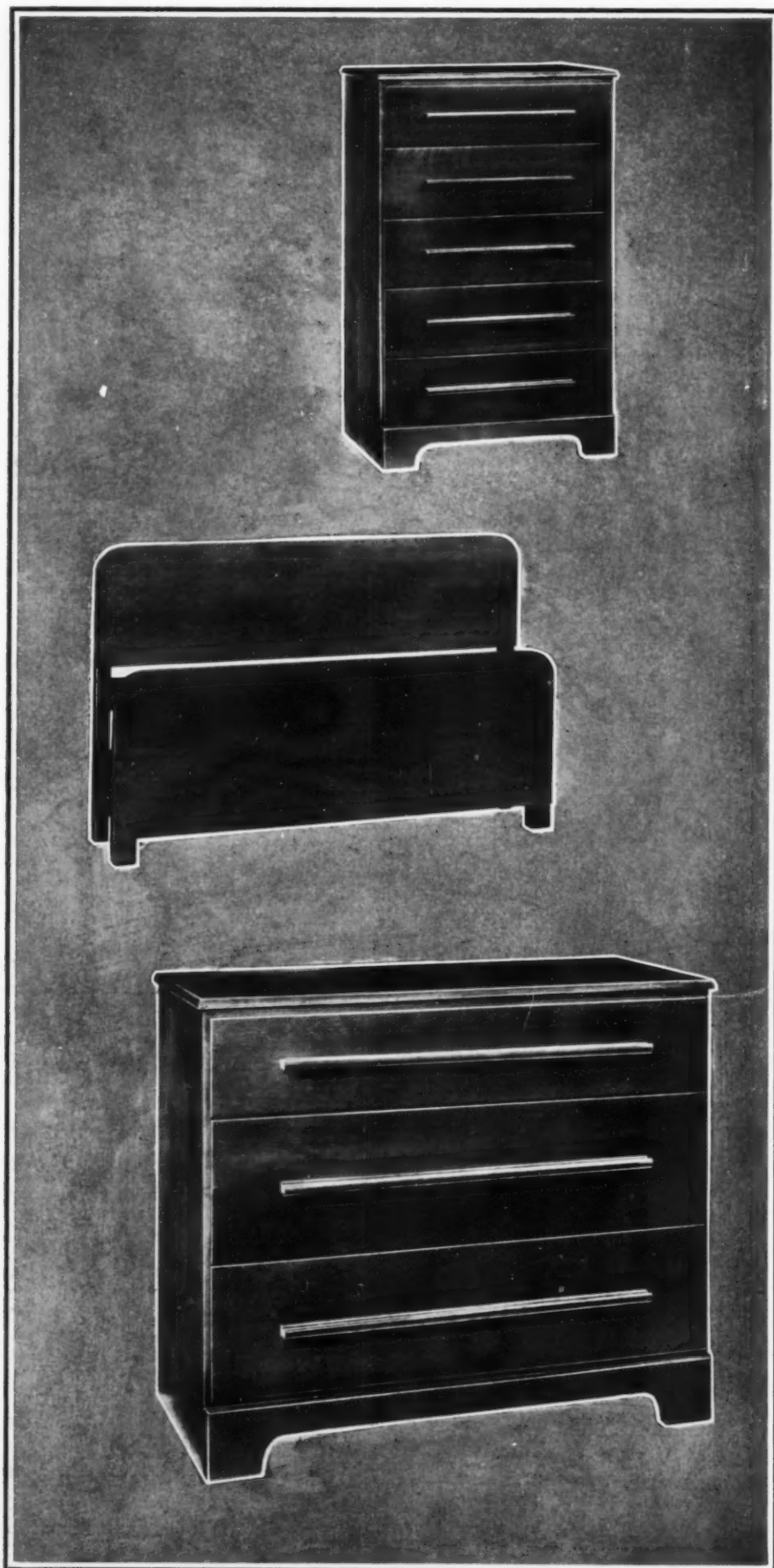
PHOTOGRAPHS ON THESE
PAGES BY ZIMMERMAN

FOR TERRACE AND GARDEN

Top: Folding club chair (No. 622). Constructed of channel steel, baked enamel finish. Wide fabric selection. Price, \$4. Armchair, perforated metal seat and back, baked enamel finish. Price, \$8. Spring lounge chair (No. 530). Constructed from oil tempered steel. Tufted cotton seat and head cushion. Price, \$10. Tray table (No. 618). Enameled finish. Price, \$4. **Center:** Left: Detail of folding club chair. Compact one motion fold-up. Right: Spring lounge chair (No. 543). Canvas seat, baked enamel finish. Price, \$9. "Two-seater" settee (No. 545-2). Perforated seat and back, enameled finish. Price, \$15.75. Tray table (No. 617). May be folded. Price, \$2. **Bottom:** Tea table (No. 614), enameled finish, removable tray, rubber wheels. Price, \$5. Wood arm rests on all chairs. All furniture on this page from the Howell Company, Geneva, Illinois.

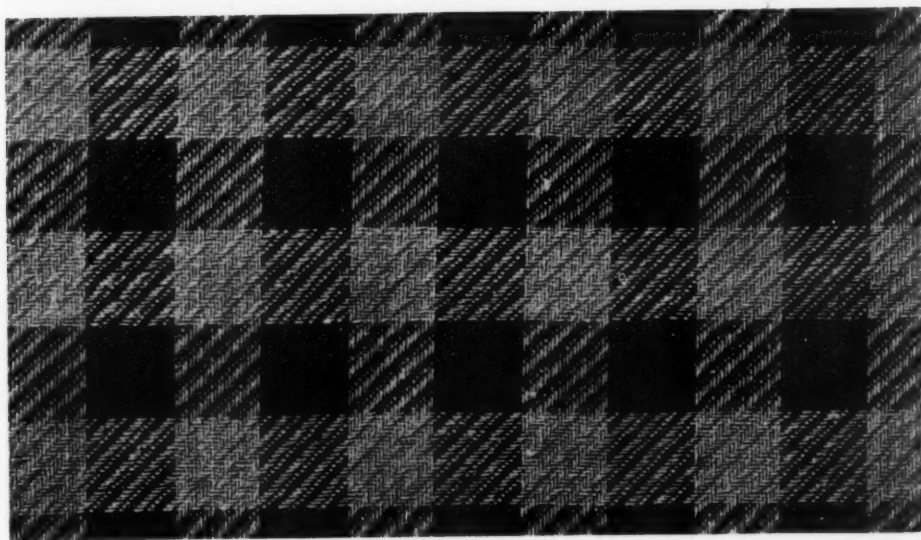
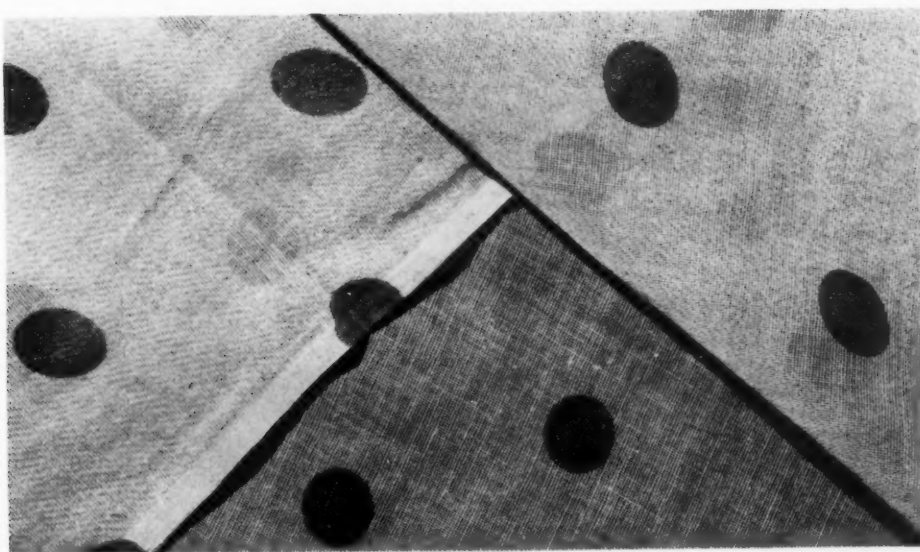
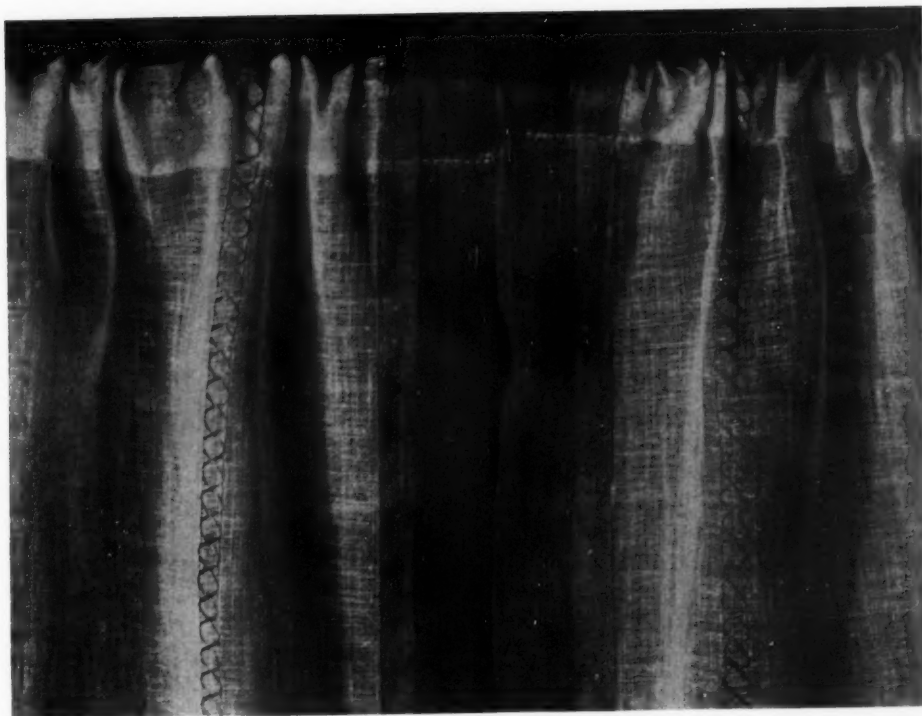


FURNITURE



Bedroom suite consisting of dresser (No. 541), bedstead (No. 543) and chest of drawers (No. 542). Retail price, \$55. Emerson Manufacturing Company, Hooksett, N. H.

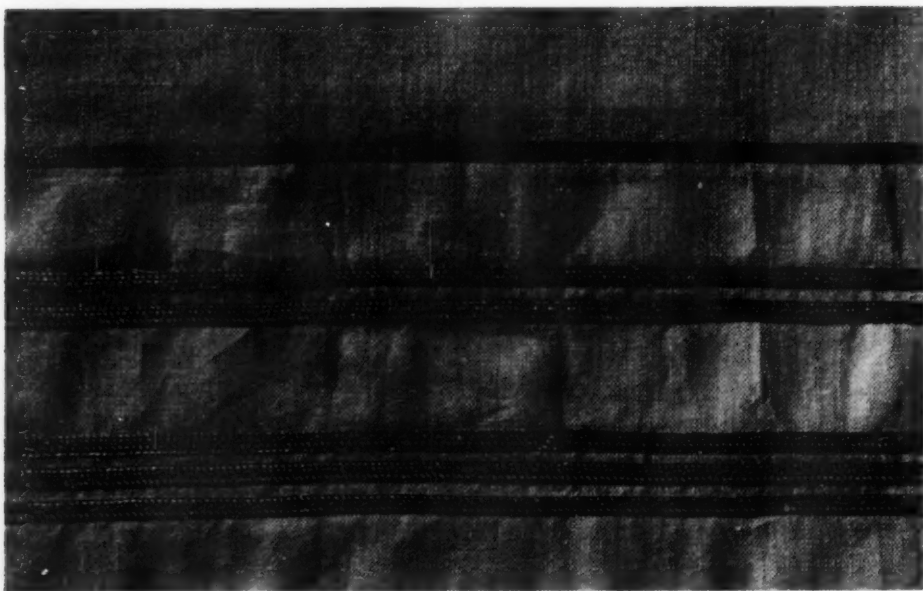
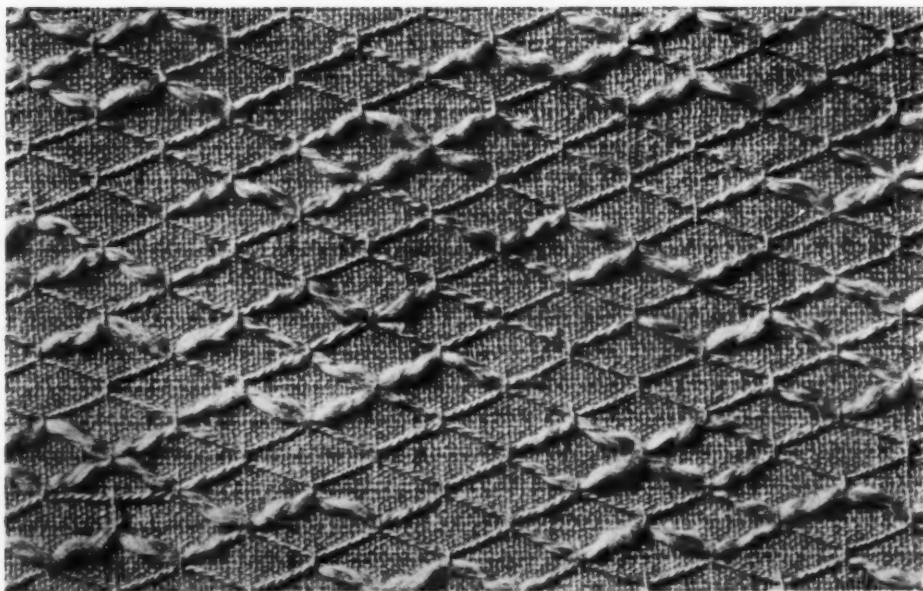
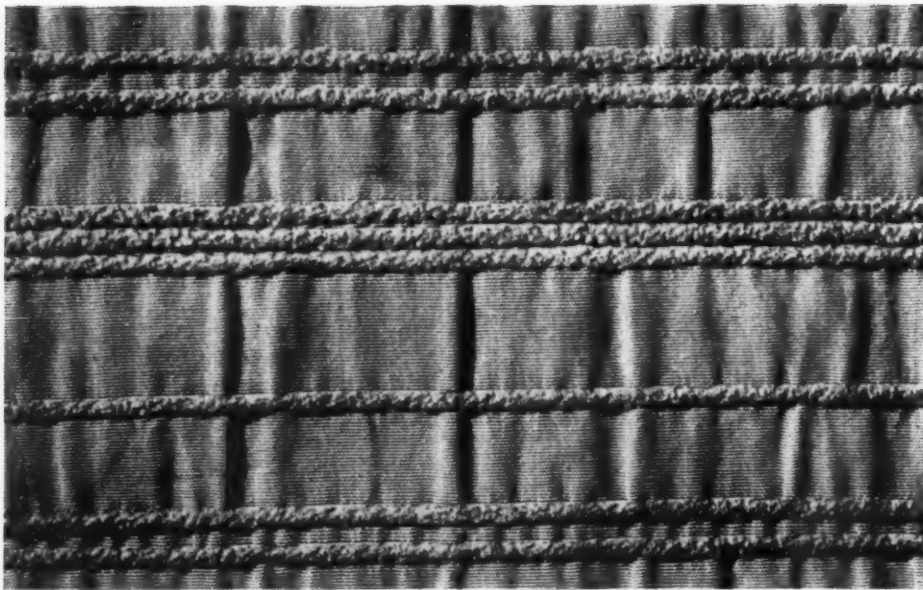
CURTAINS



Upper: White cotton voile curtains with green, blue or gold stitching. These curtains are completely made up and ready to hang. Each side, 18" wide by 35" long. Price, 15c per pair. Mail Order House. **Center:** Cotton voile in selection of colors. Width, 39". Price, 8 1/2c per yard. Mail Order House. **Lower:** Plaid wool and cotton weave. Dark and light blue and gold. Width, 36". Price, 35c per yard. Mail Order House.

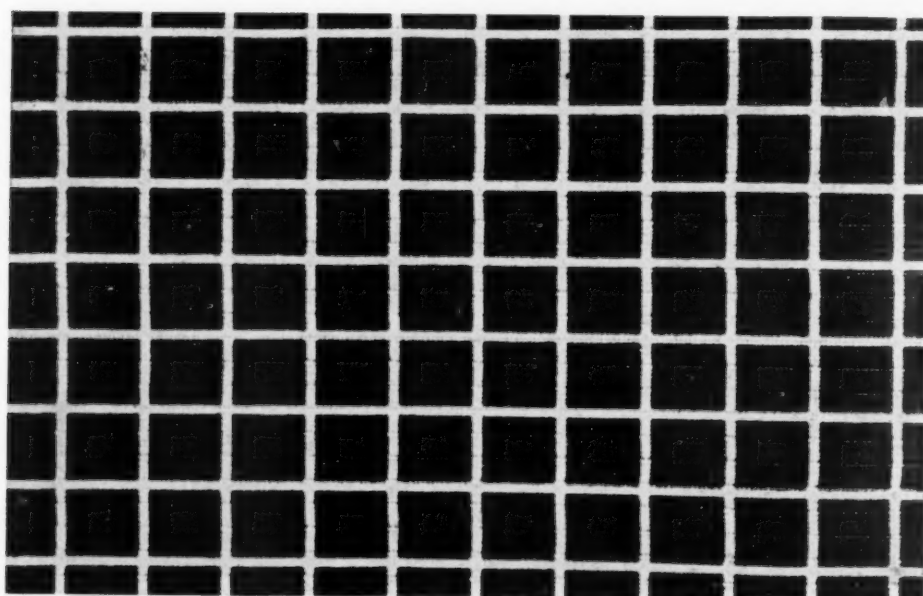
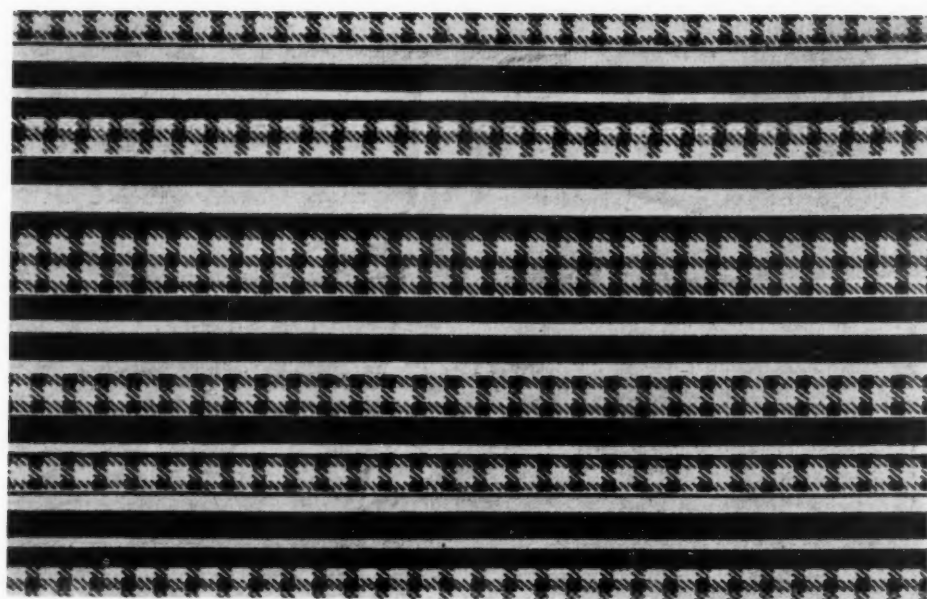
Photographs by F. S. Lincoln

CURTAIN



Upper: Chenille for side draperies (No. 280290). Colors: green, gold, plum, eggshell, blue, red, brown. Width, 39". Price, \$1.50 per yard. F. Schumacher and Company, New York. **Center:** Cotton side draperies (No. 84029). Colors: ecru and eggshell. Width, 48". Price, \$1.20 per yard. F. Schumacher and Company, New York. **Lower:** Chintz with applied braids. Lemon yellow ground, red braids (No. 245091). Width, 36". Price, \$1.35 per yard. F. Schumacher and Company, New York. Plain glazed chintzes in all colors may be obtained at 50c per yard. Revolite, similar to chintz in surface but treated with phenolic resin for waterproofing, costs 75c per yard. Width, 36".

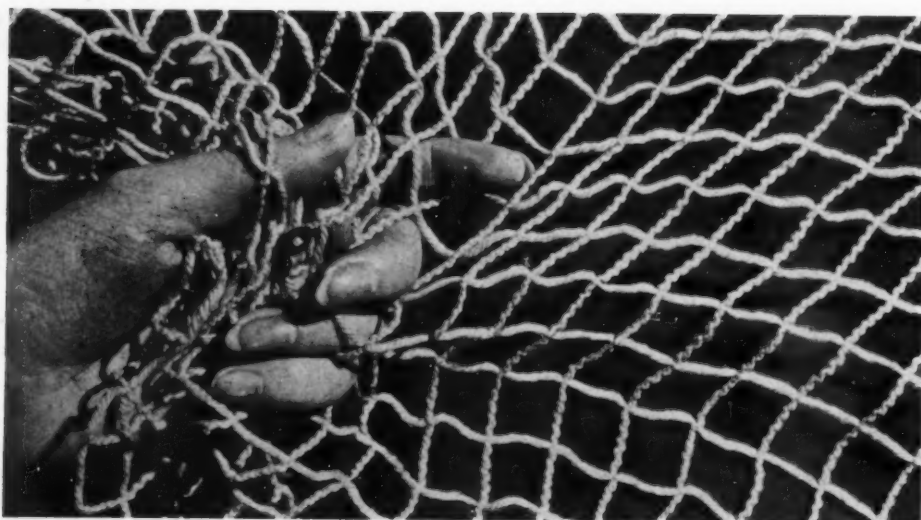
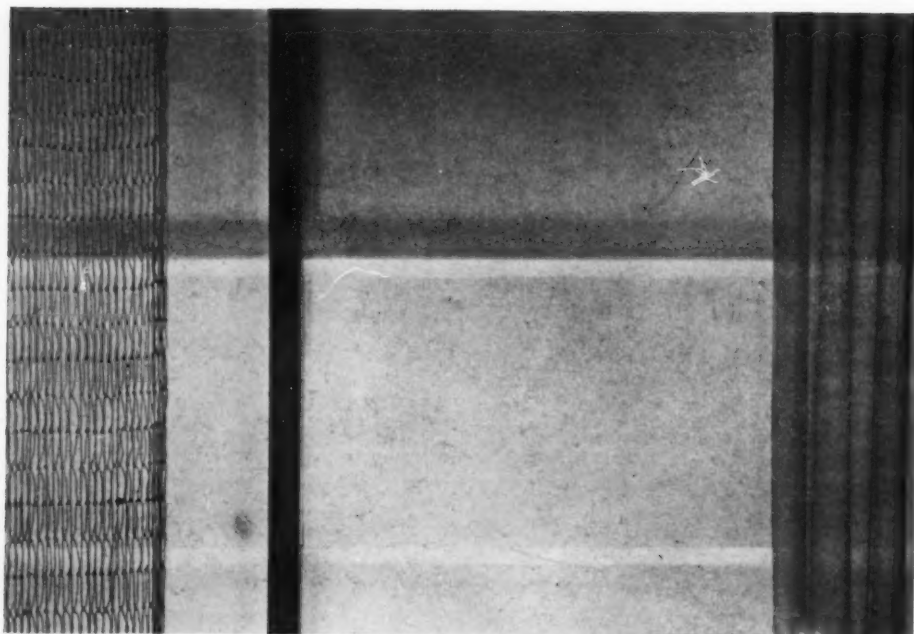
MATERIALS



Upper: Cotton print sash curtains. Red and white stripes, black and white squares. Width, 36". Price, 12½c per yard. Mail Order House. Good quality gingham may be obtained for 15c and 20c per yard. **Center:** Print on cotton weave. Brown and white. Width, 36". Price, 25c per yard. Mail Order House. **Lower:** Glazed chintz, brown and white (No. 213851)—Waverly Fabrics. Width, 36". Price, 55c per yard. F. Schumacher and Company, New York.

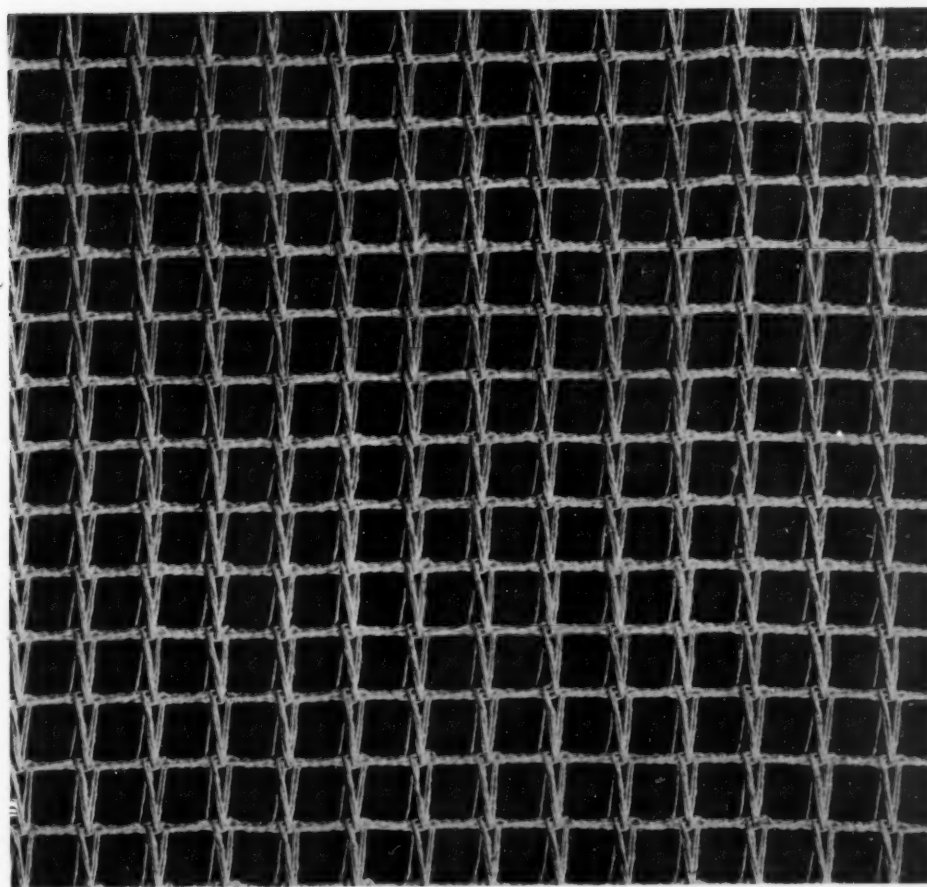
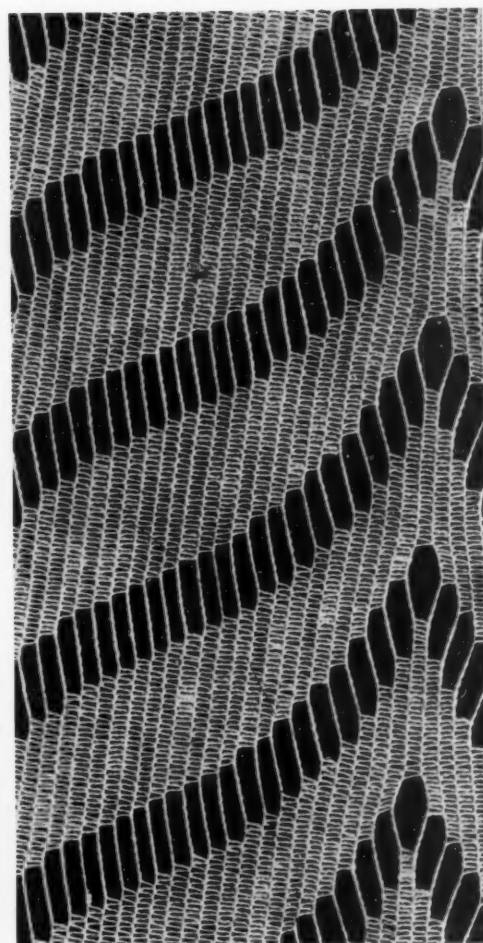
Photographs by F. S. Lincoln

CURTAIN



Upper: Window with large square net for sash drapery and oil silk or plain chintz as side drapery. **Center:** Square netting for sash draperies. May be had in blue, peach, yellow and other colors. Width, 36". Price, 60c per yard. **Lower:** Oiled silk, transparent, (No. 280525). Peach, blue, green and natural. Width, 36". Price, 90c per yard. F. Schumacher and Company, New York.

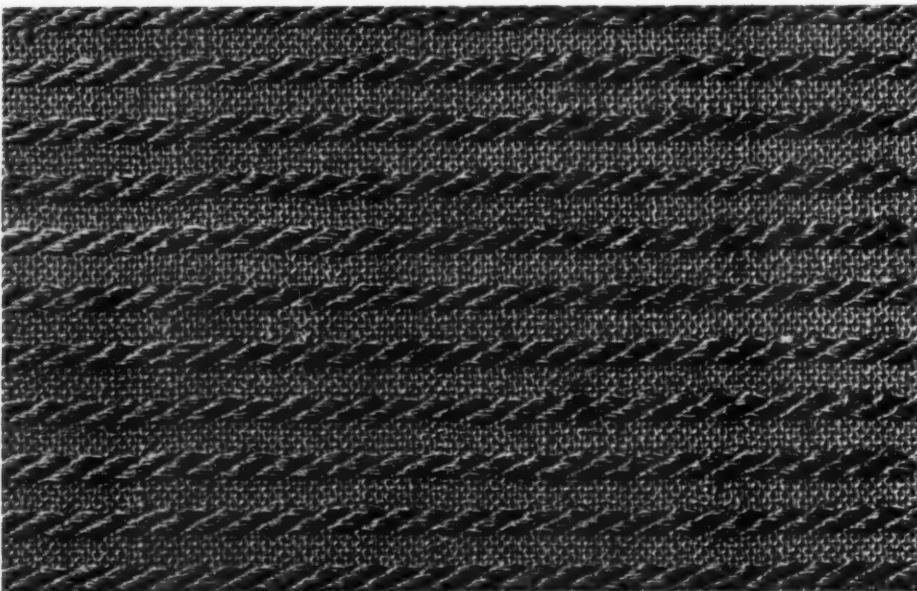
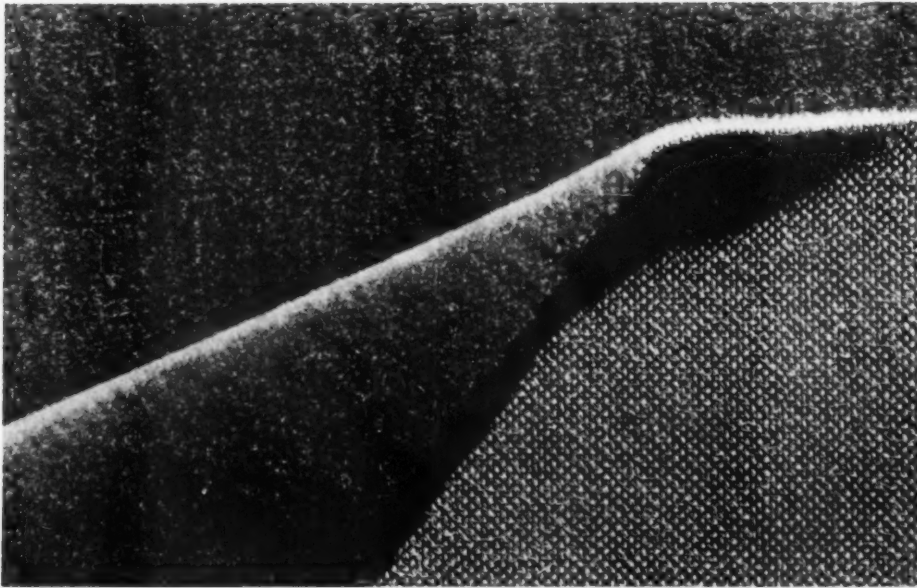
N MATERIALS



Upper: Left. Linen theatrical gauze for sash curtains or side draperies. Wide variety of colors. Width, 36". Price: natural, 15c per yard; in colors, 17c per yard. Mail Order House. **Upper Right:** French ecru sash curtain (No. 46520), completely made up. Length, adjustable; width, 36"; maximum length, 2 1/4 yards. Price, \$3.90 per pair; 90c per yard. Scranton Lace Company, New York. **Lower:** Ecru sash netting (No. 8028). Price, 50c per yard. Scranton Lace Company, New York.

Photographs by F. S. Lincoln

UPHOLSTERY

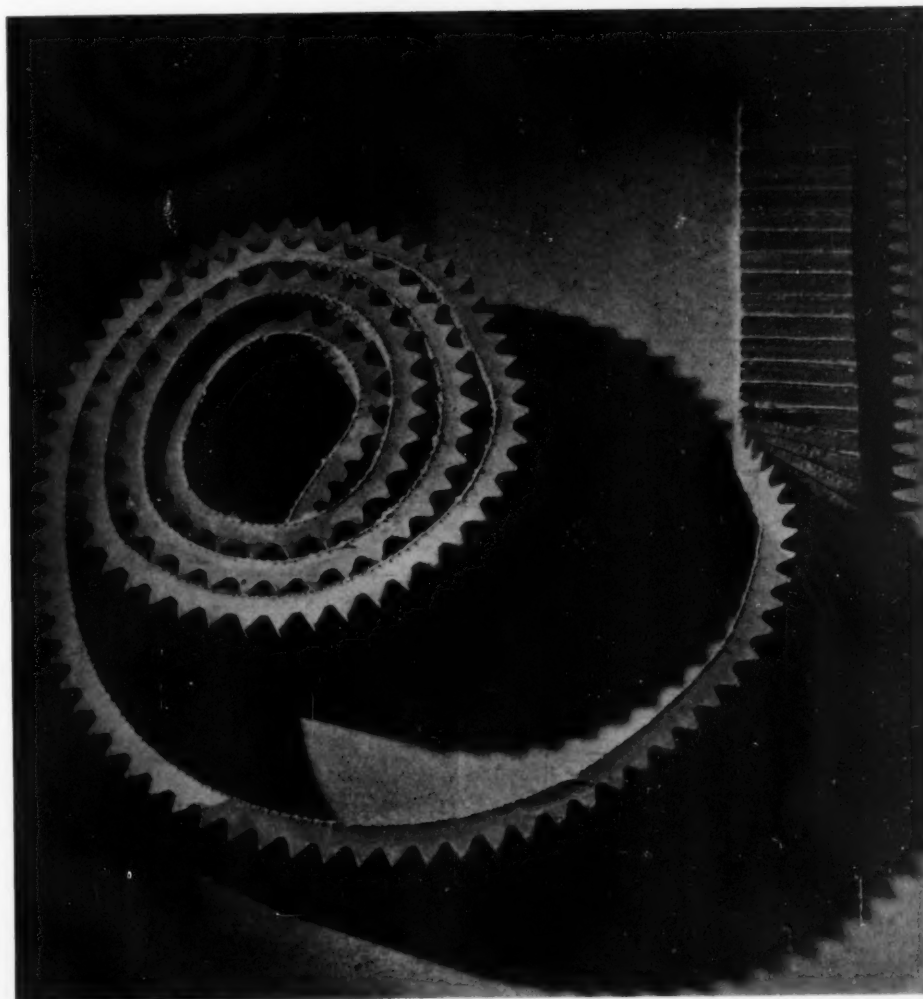
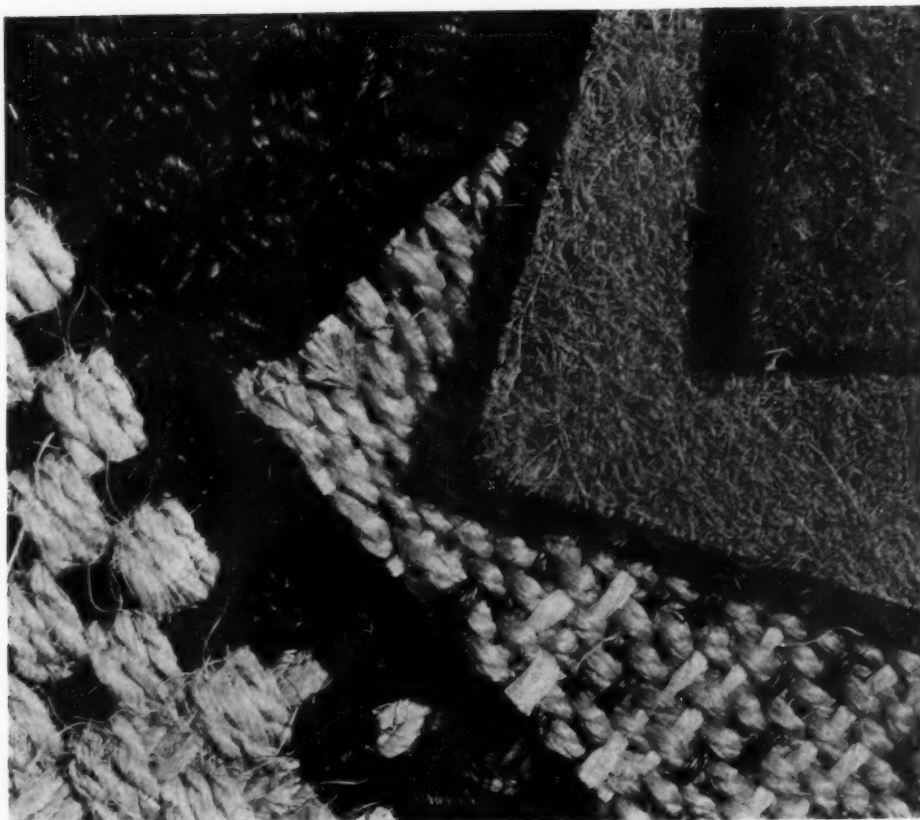
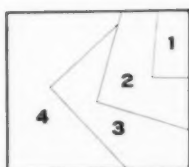


Upper: Mohair pile fabric, rubber back waterproofed. Suitable for chair upholstery. Originated for automobile upholstery. Best wearing textile goods known. Colors: browns, rusts, grays. Width, 54". Price, \$3.50 per yard. L. C. Chase Company, New York.

Center: Mohair of wool weave (#7057). A very strong and durable fabric. Colors: brown and other colors. Width, 50". Price, \$3.25 per yard. L. C. Chase Company, New York.

Lower: Mohair pile fabric (#9676)—"Kingston." Blue and other colors. Width, 54". Price, \$3.75 per yard. L. C. Chase Company, New York.

Y AND RUGS

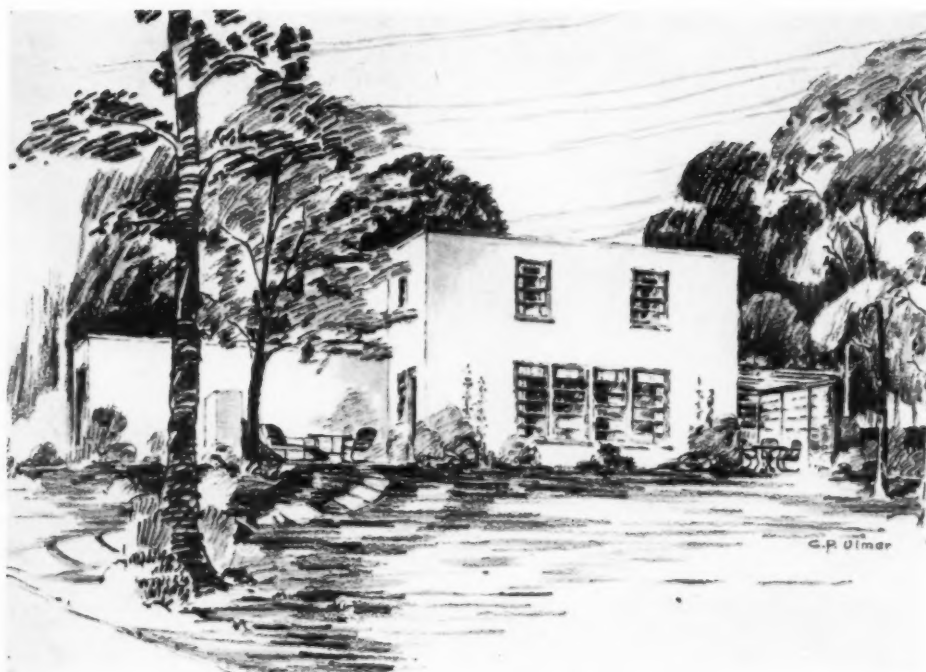


Upper: (1) Sisal rug, 9 x 12. Extremely durable. In powder blue, green, red rust, silver taupe, rose taupe, tangerine—all with darker border bands. Rug complete, \$14, or \$1.20 per square yard. (2) Jute rug, 9 x 12. Colors: blue, rose, green, taupe, rust, with darker border bands. Rug complete, \$16.50, or \$1.40 per square yard. (3) Holland Sisal rug, 9 x 12, designed with woven stripes. Rug complete, \$21, or \$1.75 per square yard. (4) Cocoa rug, 9 x 12, plain design. Rug complete, \$15.60, or \$1.30 per square yard. Plain cocoa matting in widths from 18" to 72", \$1.10 per square yard. Lower: Corrugated rubber for door mats, in standard sizes.

Photographs by F. S. Lincoln

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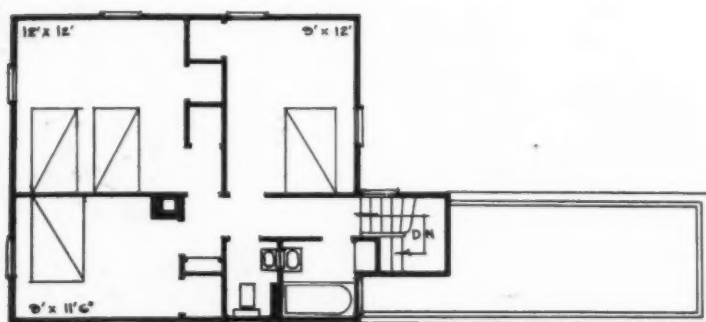
LOW-COST HOUSING RESEARCH AT PURDUE UNIVERSITY



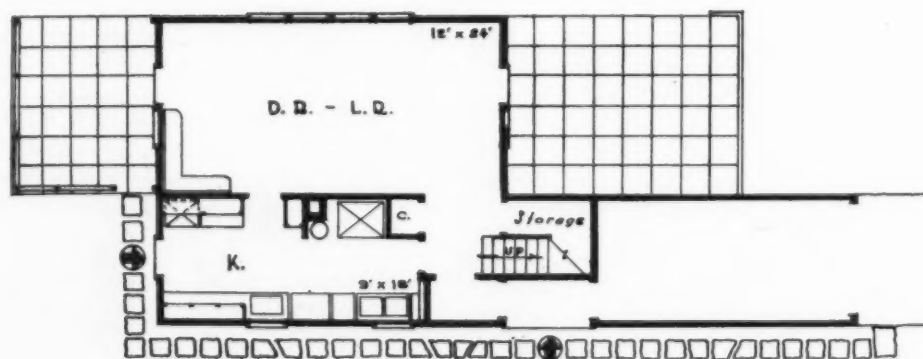
HOUSE NO. 1

Cost, \$4,681

J. André Fouilhoux - - Architect



SECOND FLOOR



FIRST FLOOR

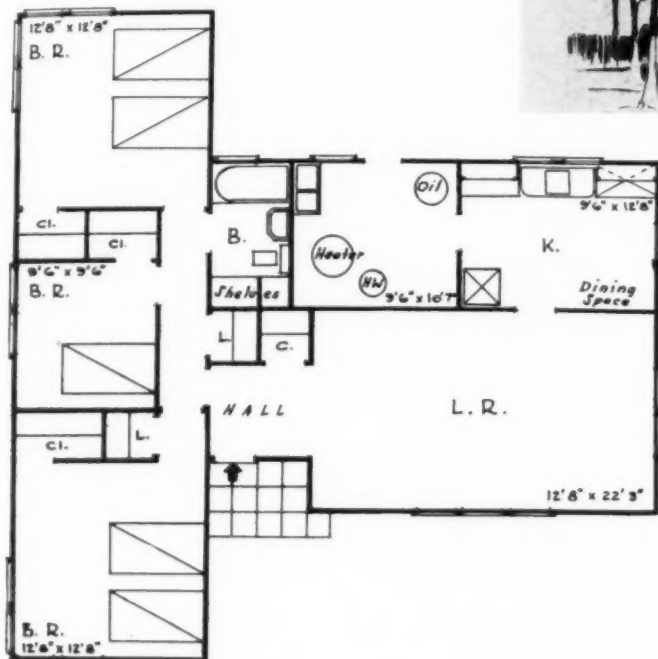
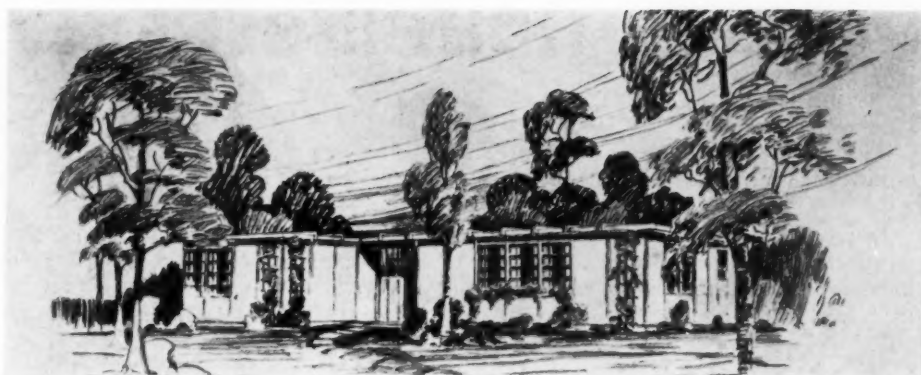
Outline Specifications: Foundations, concrete; terraces and walks, poured concrete. Floors: first floor, fill, 4" tamped gravel, slab, 3" concrete; insulation, 2" cold storage type; finish, hardwood blocks laid in mastic; kitchen, linoleum; second floor, framing, 2" x 8" joists with 1" x 8" T & G sub-floor; finish, hardwood strip flooring; bathroom, linoleum. Garage floor and drive, gravel. Walls and ceilings: framing, 2" x 4" studding, western type; insulation, mineral wool bats; exterior finish, cement stucco on paper-backed metal lath; partitions, 2" x 4" and 2" x 3" studding; interior finish, 1/4" fir plywood; ceiling finish, 1/4" fir plywood. Roof: framing, 2" x 8" joists with 1" x 8" T & G sheathing; insulation, mineral wool; roofing, 10-year built-up roof; flashing, #24-gauge galvanized iron, painted. Trim: yellow pine trim for windows, doors, base and picture mold, etc. Painting, lead and oil. Windows: wood, casement type; screens. Doors, wood. Wiring, BX cable. Plumbing: enameled iron fixtures; piping, copper tubing; water heater, 20-gallon boiler, automatic gas. Heating: forced warm air; automatically regulated; automatic flash type oil burner. Hardware: bronze and plated.

HOUSE NO. 2

Cost, \$4,625

Howard T. Fisher, Architect;

John A. Pruyn, Associate Architect

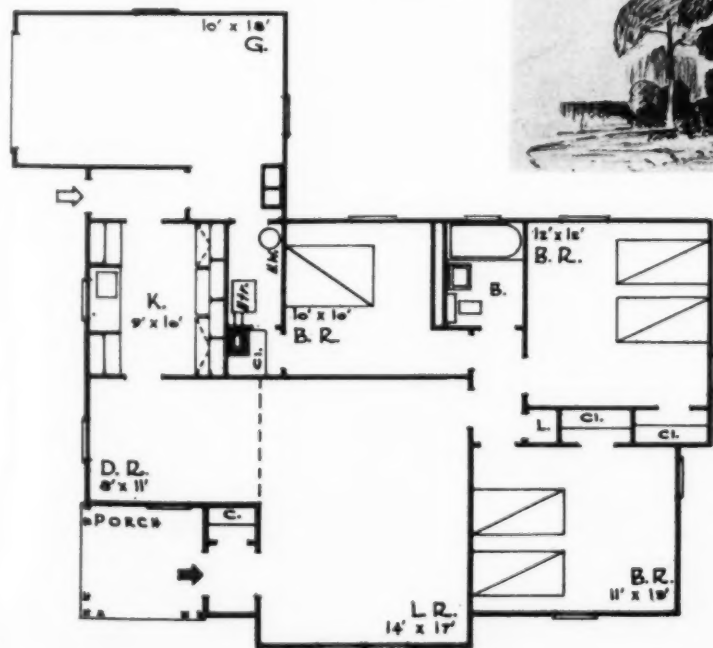
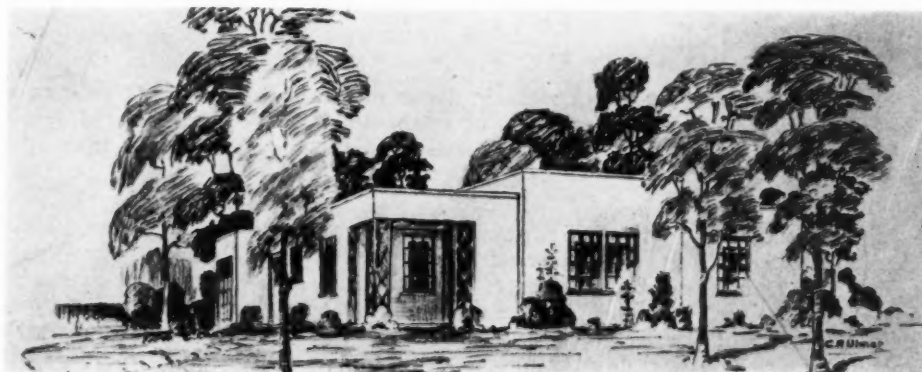


Outline Specifications: Foundations: piers, 10" diameter, reinforced concrete; sills, reinforced concrete, pier to pier. Floor: 6" tamped cinder fill; building paper laid over cinder; 4" concrete slab, steel mesh reinforcing; monolithic troweled finish; painted. Frame: #16 gauge, copper-bearing steel; studs and joists at panel point. Wall panels: built-up wood frame with stiffeners; exterior covering, 1/4" asbestos cement board; interior covering, 1/4" regular fir plywood, painted. Roof panels: built-up wood frame with stiffeners; ceiling plywood, 1/4" fir; roof plywood, 3/8" fir; roofing, #24-gauge galvanized copper-bearing steel; flashing, #26-gauge galvanized copper-bearing steel. Insulation: two separated sheets of aluminum foil in each panel. Trim: doors, windows, base, of steel. Windows: steel, outswinging casements; steel frames; screens, aluminum. Doors: wood. Hardware: windows, bronze; general, brass finish. Kitchen cases, steel. Painting, lead and oil. Plumbing: piping, galvanized steel and cast iron; fixtures, enameled iron. Wiring, BX cable. Heating: forced warm air automatically controlled; automatic oil-fired.

HOUSE NO. 4

Insulated Steel Construction Co.,

Designers



Outline Specifications: Foundations, concrete. Floors: concrete, 1:2:4, troweled finish 1:2 on fill; 13/16" hardwood laid on 2" x 4" creosoted sleepers; kitchen and bathroom, linoleum. Walls: frameless steel sections, painted; sections filled with insulating material; walls and ceilings, plastic paint finish. Roof: cellular steel construction; 1" rigid insulation board; roofing, standard type built-up roof; flashing, #26-gauge iron. Exterior trim, cypress. Windows: wood, double-hung. Doors, wood. Cases, wood. Wiring, BX cable. Plumbing: pipe, cast iron, galvanized iron, black iron; water heater, 30-gallon range boiler with thermostat; fixtures, enameled iron. Heating: forced warm air, gas-fired furnace automatically regulated.

PURDUE HOUSING RESEARCH PROJECT

The Purdue Housing Research Project was first publicly announced at a meeting of interested members of industry held at Purdue University on June 1, 1935.

In the development of the details of the housing research program since that time every effort has been made to conform to the expressed wish of the members of industry there assembled to engage in research and study of a basically practical nature.

Nine houses are now in actual construction as a practical study of cost items. These houses are each of a different basic construction and represent the important materials and methods now available. Leading architects of the country have given freely of their time in designing the houses. Industry has been consulted on the proper use of the several materials employed.

Each house is designed to accommodate an average family of parents and one or more children of each sex. A garage is also listed as a necessity. This specification fits the mass of the prospective home-owning public. The specifications also state that the house must be erected under ordinary conditions at a cost not to exceed \$5,000. It is recognized that this requirement does not fit the mass of prospective home owners. Those in charge of the Project were directly cognizant of this fact. The general income level of the country will not support an extensive housing development even in the \$5,000 price class.

It has been generally necessary to eliminate dining rooms. Motor-driven oil burners and automatic stokers could not be included. Those in direct charge of the project, as well as the architects and industrial engineers who assisted in the planning, were of the opinion that no compromises in the basic soundness of construction should be made in favor of such items.

In order to parallel as nearly as possible the situation which confronts prospective home owners, bids on the houses have been obtained from separate contractors, and no special price concessions from material suppliers have been permitted. The results of the bidding indicate prices of all of the houses will be very close to the established \$5,000 maximum limit.

Preliminary surveys have been made in the various fields in which cost reductions might be effected. When construction of the houses is completed and detailed cost information of their component parts has been obtained, a more thorough study will be possible.

These preliminary studies indicated no great practical possibilities in cost reduction. In materials a great share, or what might be termed a disproportionate share, of cost appears in the distribution charges from original producer to ultimate consumer. Inasmuch as no one in this chain may be regarded as making too much profit, it follows that the only point of attack must be against the system as a whole. Such approach may produce savings in theory but the practical possibilities of making readjustments on the basis of any other distribution system looms as only a remote possibility. Experience has shown that the present system is apparently essential to the satisfactory merchandising of materials. No change seems possible short of a complete revolution engineered through the combined efforts of the entire building industry.

Reduction of manufacturing costs in anticipation of increased volume appears as another possibility but again it presents practical difficulties. Margins of profit are now slender in many lines. A ten per cent reduction in factory prices may wipe out profits for a considerable period and produce only a small saving to the home owner because of intervening distribution mark-ups.*

The Quality of Houses Which Can Be Produced in This Price Class

Results of Actual Bidding on the Houses

Cost Reduction Possibilities

*Extract from Report prepared by Frank J. Watson.

T PORTFOLIO OF LOW-COST HOUSES



Photograph by Stephen H. Willard

GUTHRIE HOUSE

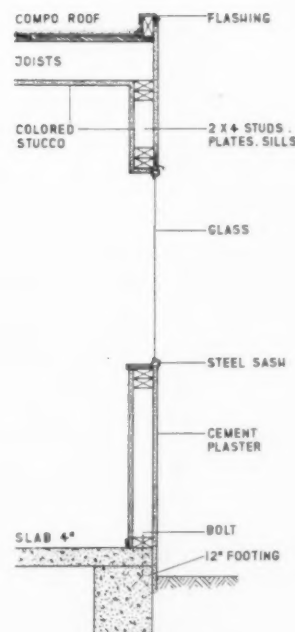
PALM SPRINGS, CALIFORNIA

VAN PELT AND LIND, ARCHITECTS

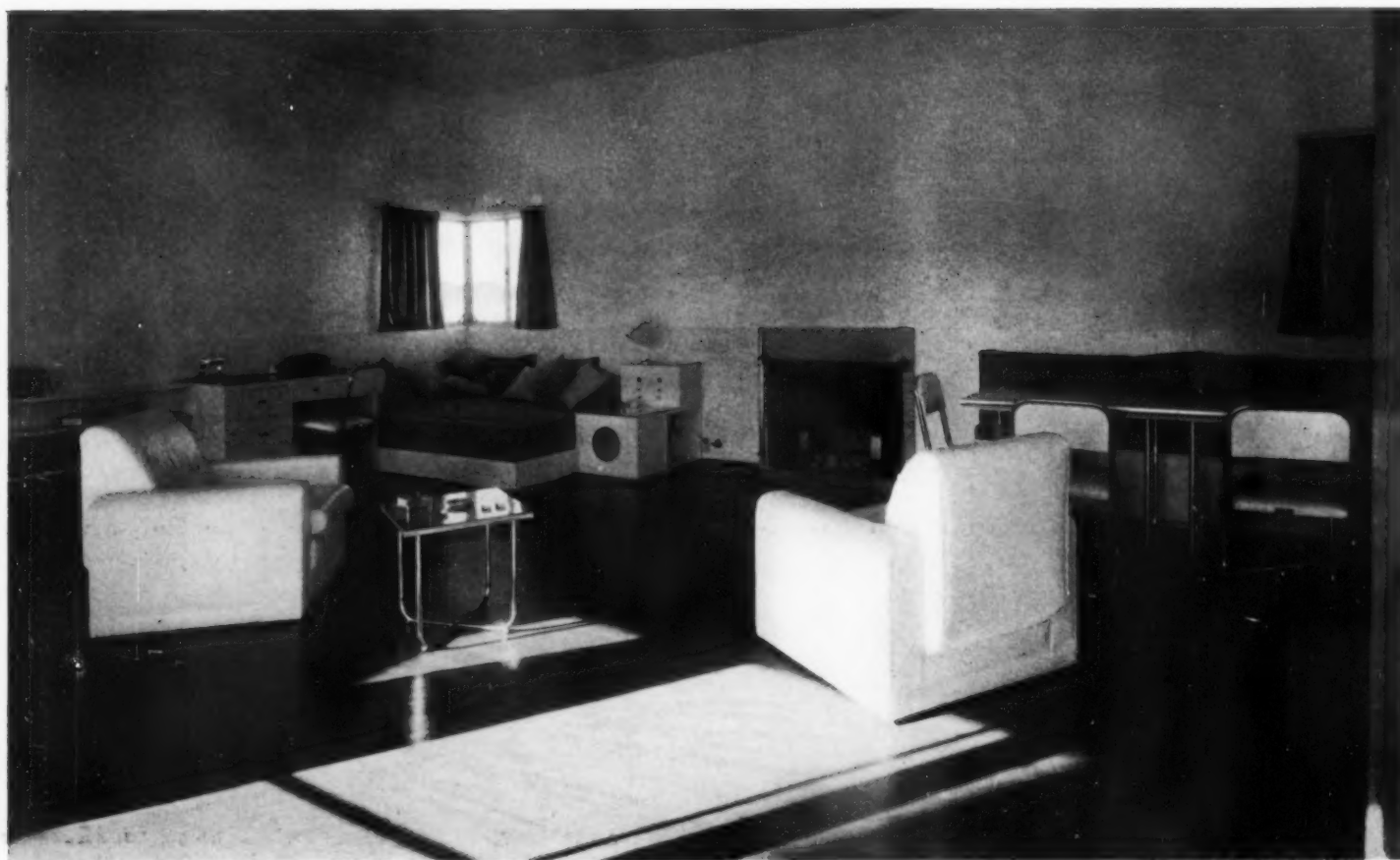
The house is of frame construction and stucco, facing south. The end walls of projecting wings are windowless for privacy. A carefully devised color scheme of sage green walls in the patio (to avoid glare) and warm white elsewhere (for heat-reflection) helps to tie the building into the landscape. The south wall of the living room is entirely glass, amply protected by sliding awnings and aluminum-faced curtains.

Materials and construction.

Footings: concrete, 12-in. deep (soil dry sand). Floors: cement, linoleum-covered in living room and kitchen. Amhaco broadfelt in bedrooms. Frame: wood, 2 x 4, 16" o.c. ceilings, 2 x 6 kitchen, 2 x 8 bedrooms, 2 x 10 living room, all 16" o.c., bridging every 6 feet. Wall finishes: exterior, cement plaster over waterproof paper and chicken wire; sand finish, cold water paint. Interior, integrally colored stucco over plasterboard; smooth trowel finish, ceilings same. Roof: 3-ply built-up with gravel, galvanized iron flashing at copings; slight roof pitch toward drains. Windows: steel casements with operators, bronze screens, no muntins. Exterior doors: white pine, combination doors with screened sash insert; weather-stripped aluminum thresholds. Plumbing: soil, cast-iron; water and gas pipe, galvanized iron. Crane fixtures. Lighting: wiring, BX cable; flush ceiling fixtures; exposed Lumiline tubes over mirrors. Heating: Payne vented gas console-heaters in rooms exposed, white eggshell finish. Hardware: Schlage dull chromium finish; chromium polished in kitchen and bathroom. Cabinet work: white pine, 3/8" plywood flush in 1-in. frames. Fireplace: sides and hearth firebrick, lintel concrete; chimney, concrete blocks. Cost (built in fall 1935): \$3 per sq. ft. for all work in general contract, including built-in cabinets, but without floor coverings, gardening, and architects' fee.



TYPICAL WALL SECTION

*Photograph by Stephen H. Willard*

THE LIVING ROOM

By a careful analysis of function, this room is so designed that traffic does not conflict with the living area. By centering the fireplace on the north wall, with dining furniture to one side and couch, desk, and radio to the other, this separation is carried even further. Floor is blue linoleum, walls and ceiling light yellow, woodwork and built-in furniture eggshell, chairs white Fabrikoid, curtains and cushions blue.

0 5 10 20

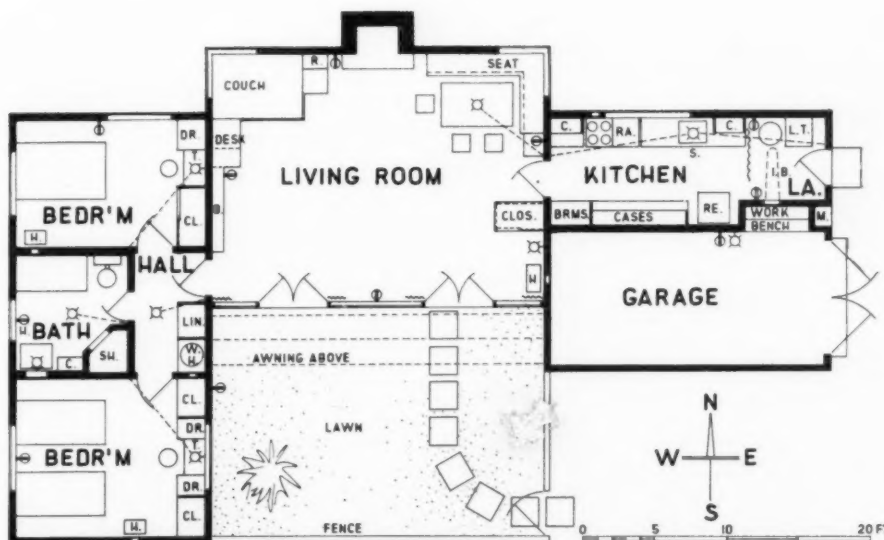
NORTH ELEVATION

SOUTH ELEVATION

WEST ELEVATION

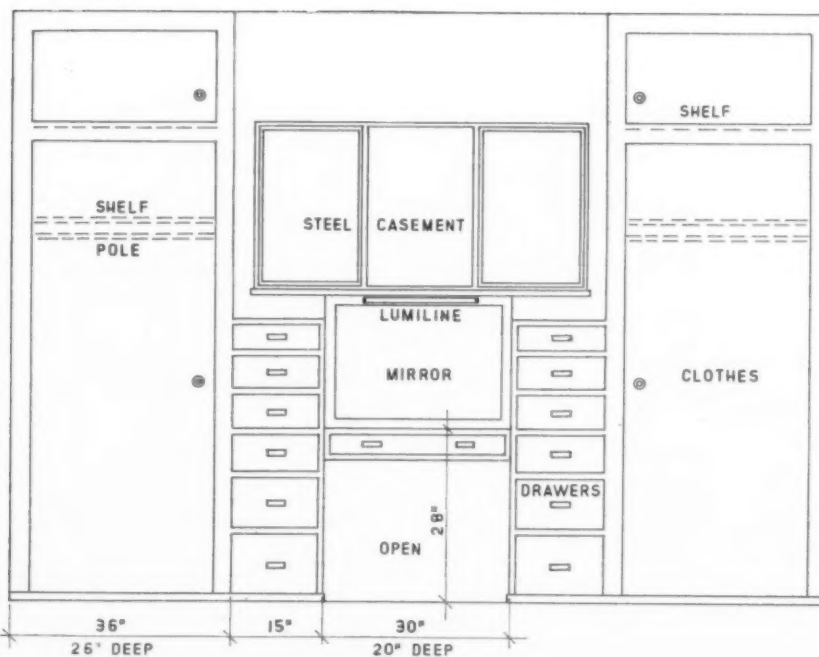
EAST ELEVATION

The plan is worthy of study for its handling of the H-type. Garage, kitchen and laundry in the right wing; living and dining in center; sleeping and bath in left wing. All accomplished with minimum corridor space and no sacrifice to inter-room traffic.





MASTER BEDROOM



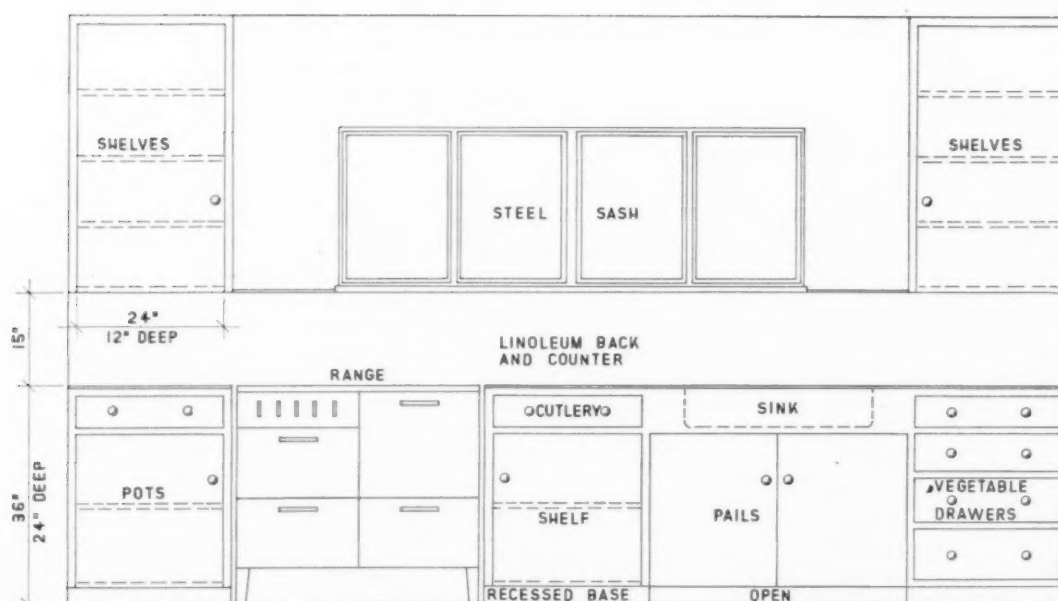
ELEVATION: CLOTHES, LINEN, AND DRESSING CASES

Carefully-studied provisions for clothing-storage and dressing characterize both bedrooms. In the master bedroom storage space for two people, along with well-lighted and compact dressing table, is provided. Floor covering is white "Broadfelt," walls, ceilings and bedspreads blue, furniture and cases eggshell.

Grouping of kitchen and laundry equipment is so arranged that functions of preparing and serving food are distinct from laundry work, yet both are confined to one area of house.



Photographs by Stephen H. Willard



NORTH WALL KITCHEN CASES



Photograph by Stephen H. Willava

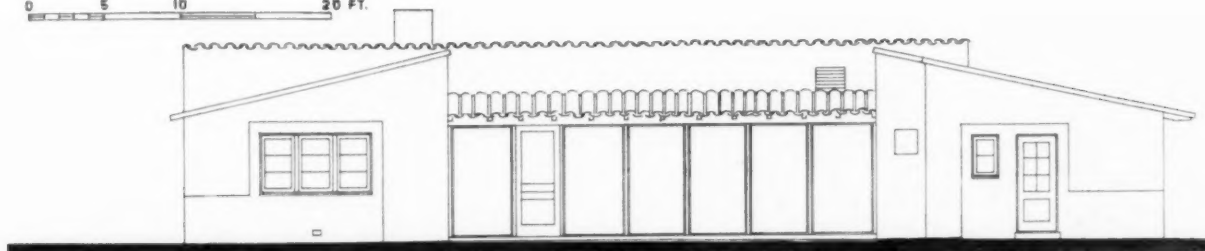
VIEW FROM THE SOUTHEAST

The house is frame construction and stucco. The large screened living porch reduces the living room area. Fireplaces in living room and master bedroom furnish only heat. Exterior color scheme: sage green wainscot, oyster white walls, tile roof in natural colors, chartreuse yellow doors and wood casement sash.

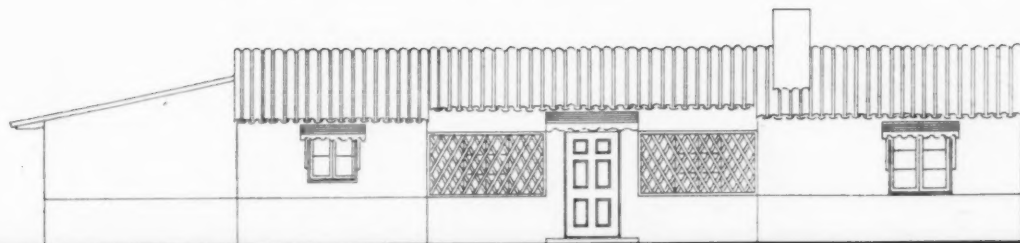
Materials and construction.

Floors: cement, color in top dressing; floors and footings poured at same time for economy. Walls: 2 x 4 studs, 16" o.c., plastered both sides. Roof: wood rafters and solid sheathing; all roofs "shed type," simplified framing. Roof tile: red tile sprayed with color "slip" baked on. Windows: stock wood casements. Doors: stock four-panel, sugar pine. Paint: interior and exterior walls and ceilings, cold water paint. Finished woodwork, exterior zinc and lead paint; bathroom and kitchen walls, washable wall paint. Interior woodwork, eggshell enamel. Interior tile: kitchen counter, shower floor and base, Pomona tile. Plumbing: all fixtures Crane; double kitchen sink with removable clean-out strainers. Fireplace: two-flue chimney; perforated gas pipe lighters at hearth to eliminate kindling wood. Awnings: Kinney "shutter" awnings. Cost (built in 1934): \$2.70 per sq. ft., not including decorating, landscaping, or architects' fee.

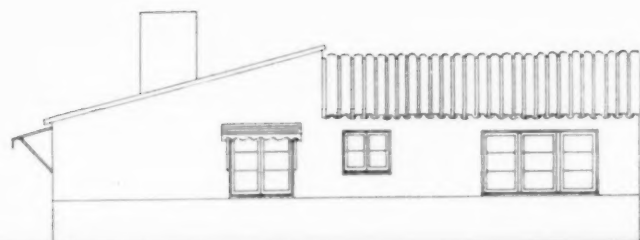
0 5 10 20 FT.



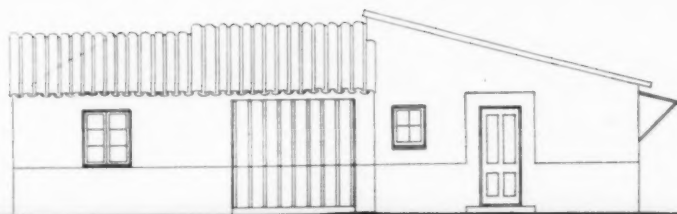
NORTH ELEVATION



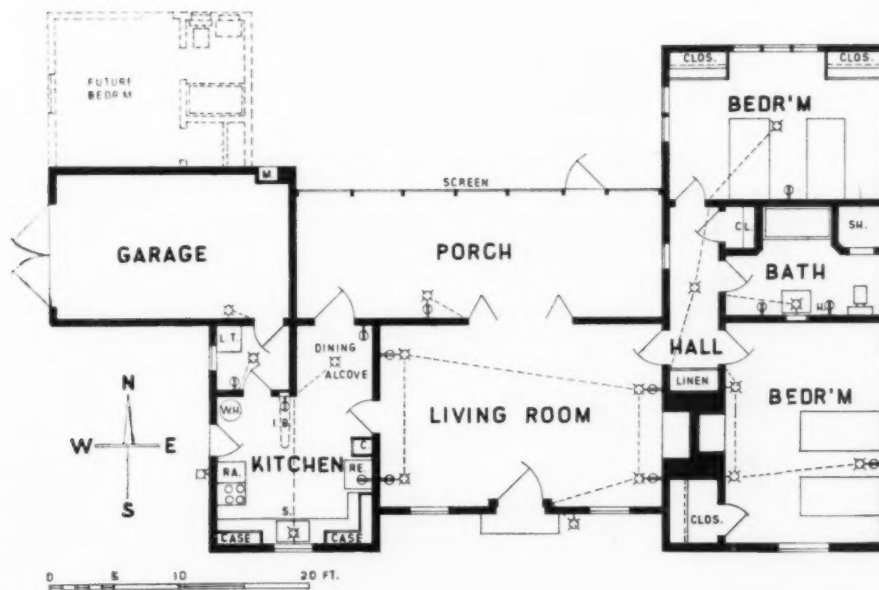
SOUTH ELEVATION



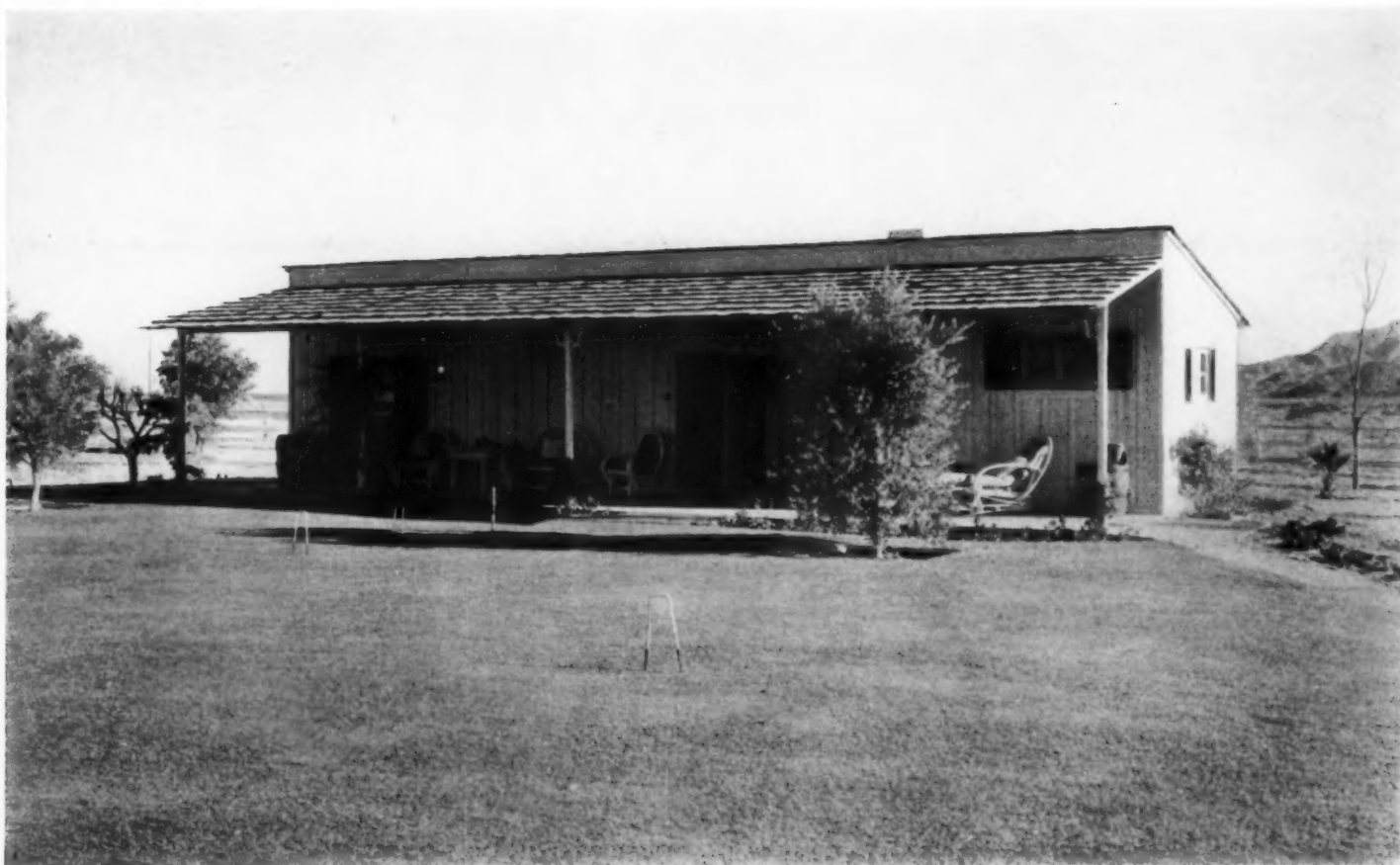
EAST ELEVATION



WEST ELEVATION



This house is set diagonally on 120-foot square corner lot to give maximum distance to property lines and to permit best exposures and views. Accordion doors open living room on to porch. The living room is kept small so that it may be heated by the only heat source, the fireplace.



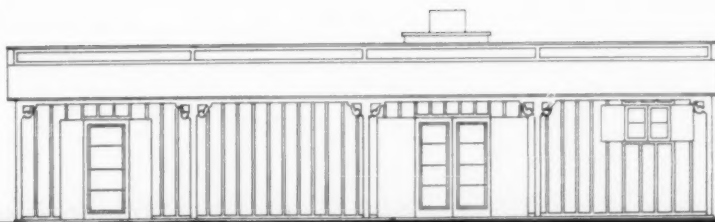
Photograph by Stephen H. Willard

A compact and straightforward handling of plan results in a simple and pleasing structure. Of frame construction, with redwood board-and-batten walls, the house is painted an off-white, with dark blue shutters and yellow doors and windows. The roof is of redwood "shakes" in natural color.

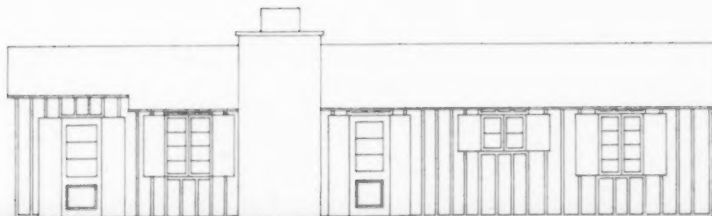
Materials and construction.

Floors: cement, integrally colored top dressing; color tan, waxed. Walls: 2 x 4 studs, 16" o.c. Roof: exposed rafters, shed type. Finishes: exterior, redwood boards and battens; roof, 1 x 36 split cedar shakes. Interior, living room California knotty pine; other rooms plaster. Paint: exterior, "National Lead" paint. Interior, living room walls bleached and polished with white wax; ceilings and other walls cold water paint; bathroom and kitchen enamel. Heating: Payne vented gas console-heaters, eliminating basement for furnace. Cost (built in 1934): \$3 per sq. ft. for items in general contract.

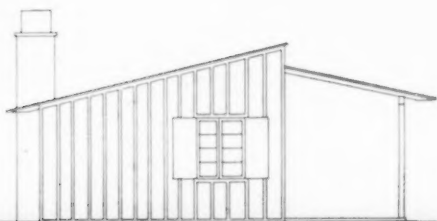
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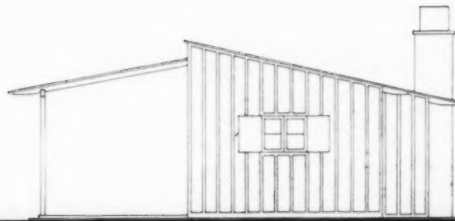
NORTH ELEVATION



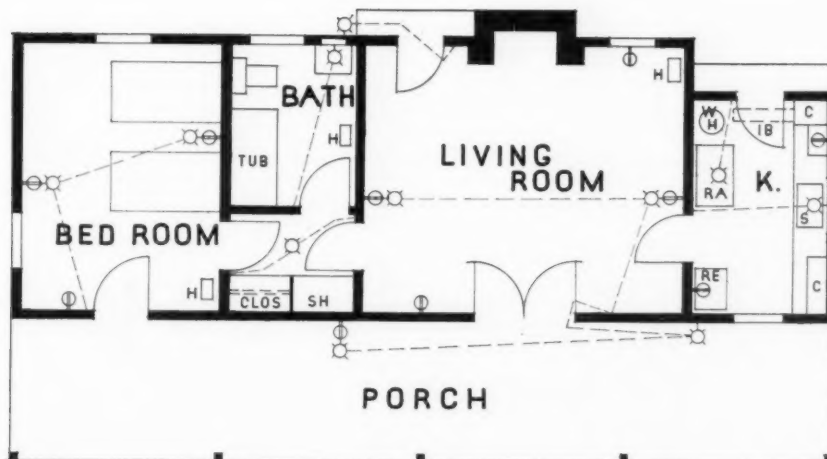
SOUTH ELEVATION



EAST ELEVATION



WEST ELEVATION



0 5 10 15 FT.



This plan represents the smallest house-unit with complete equipment. It is suited to use as a quest house or week-end house. It is the first stage of an arrangement to which other rooms may be added. The plan affords maximum exposure to all rooms.



Photographs by Bert Clark Thayer

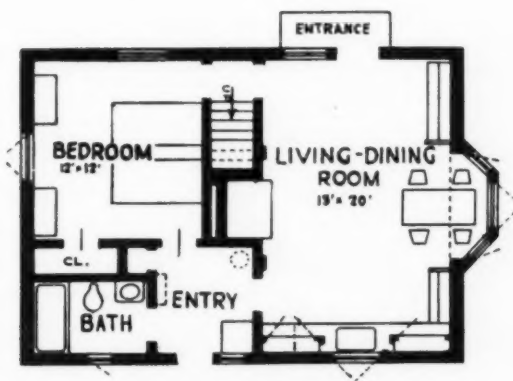
A small house (three bedrooms) having a combination heating unit, cooking element and water heater. Construction: concrete footings and first floor, wood second floor and roof construction, concrete blocks walls, steel sash, copper metalwork.

Construction costs (all prices include materials and labor at union wage scales):

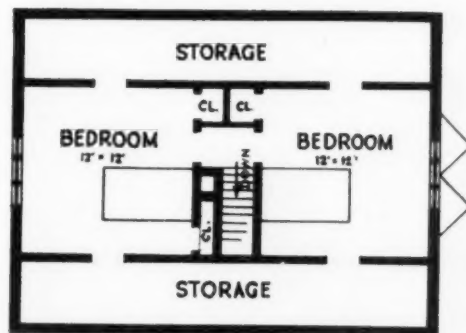
Excavating, masonry and carpentry, lumber, electric wiring and painting	\$2,100
Rough plumbing, 200 feet copper flashing	255
Plumbing fixtures	100
Septic tank	50
"Heaterange"	175
Hardware	26
Electric fixtures	35
Screens	60
Total cost	\$2,801



COMBINED LIVING-DINING ROOM AND KITCHEN



FIRST FLOOR PLAN



SECOND FLOOR PLAN



Photographs by Hedrich-Blessing Studio

WHITE AND WEBER, ARCHITECTS

JOHN BELL, LANDSCAPE ARCHITECT

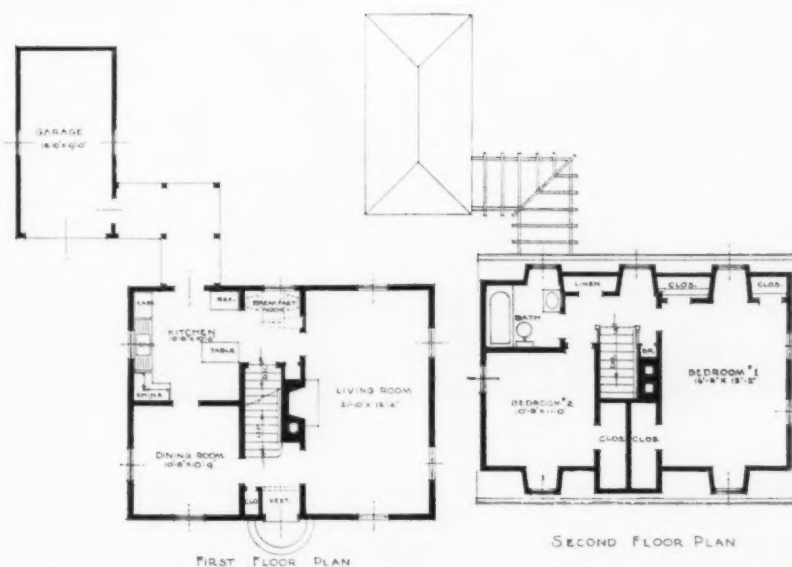
One of a group of 20 houses in a development sponsored by the Jewel Tea Company for its employees. This house, of wood frame construction with concrete foundations, is insulated with a $\frac{1}{2}$ " blanket-type woven wire lath. Economy is achieved by the compact plan, simple roof framing, minimum lineal feet of wall. Heating system: gravity-feed hot air system. Exterior color scheme: white walls, gray trim, blue-gray wood shingles.





WHITE AND WEBER, ARCHITECTS

Another house in the same group. Of similar construction and design, this house is somewhat smaller. The same economy of plan is to be observed. Exterior color scheme: white walls, blue-green shutters, black shingle roof.



COTTAGE FOR MR. H. B. COOK

NORWALK



SOUTH ELEVATION



EAST ELEVATION

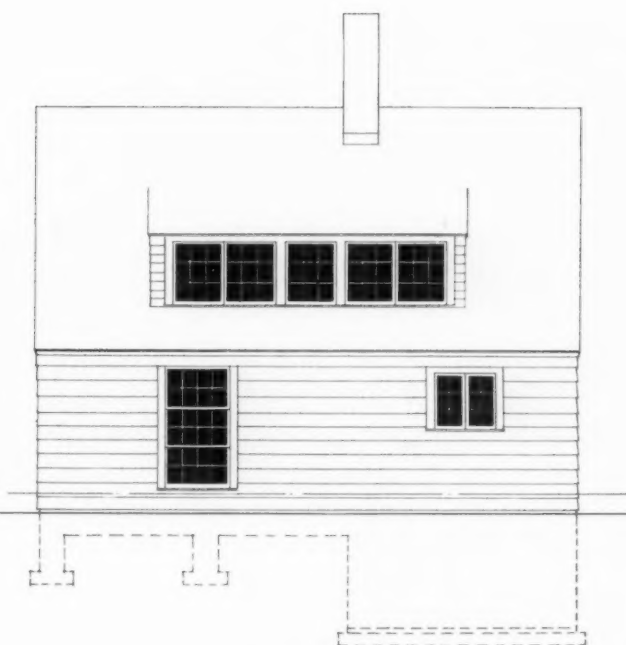


A small house to serve as a background for a fine collection of French Provincial furniture. The use of brick and slate for the main floor, pine-faced walls and rough hardware contribute at once to economy and desired appearance.





NORTH ELEVATION



WEST ELEVATION

Materials and construction.

Concrete block foundations, native stone above grade, no waterproofing; wood frame walls and roof, wood shingle facing; first floor concrete slab with slate, brick, and linoleum finish, second floor wood. Interior finish: painted board walls and ceilings except plaster ceiling in living room; no trim, doors being directly on studs; living room floor slate, entry floor brick, kitchen and bathroom linoleum. Exterior finish: shingle walls white, shutters blue-green, roof shingles natural.

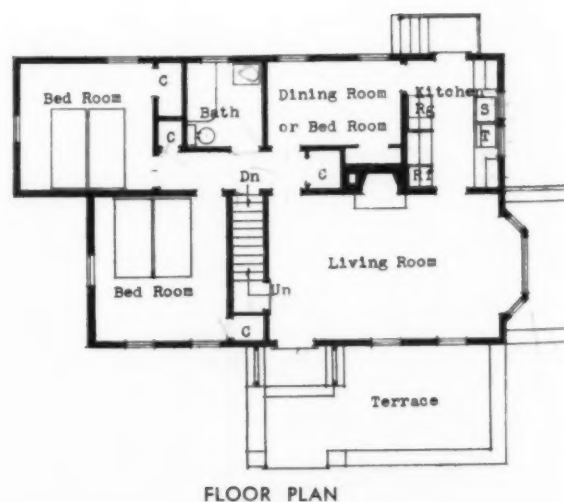




Photograph by Gottsche

WALTER B. KIRBY, ARCHITECT

Concrete foundations, wood frame wall, shingle facing. Wall finishes consist of pine paneling in living room, hard plaster in kitchen; other rooms, plaster and paper. Rock wool insulation. Heating is by steam, oil burner; Taco hot water heater. Exterior of house is white; roof, gray; shutters, black.



FLOOR PLAN

HOBART HOUSE OF STEEL PANEL CONSTRUCTION



GENERAL VIEW

This house, developed by Hobart Brothers, manufacturers of Troy, Ohio, is of steel panel construction. Each wall unit consists of two 4' x 9' steel sheets welded together with a 4" space between the sheets for insulation and strength. Angle girders are used in the wall units, spaced 1' apart. Also on each wall panel assembly the top, bottom and sides are offset $\frac{3}{4}$ " to allow for slip-fit of the adjoining panel. #18-gauge sheet steel is used on the roof with $\frac{1}{8}$ " x $1\frac{1}{2}$ " x 2" steel angles for reinforcing.

The house shown has concrete floors with "Ozite" felt carpeting cemented on carpet felt, direct to the concrete.

Quoted price: \$3,500 to \$4,000, including materials, foundations, heating, plumbing, wiring, painting, and erection.



HOUSE OF DORIS L. BURBANK

BEDFORD HILLS, NEW YORK



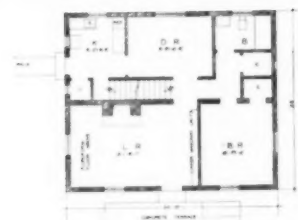
Photograph by John Gass

DESIGNED BY C. EVERETT BURBANK

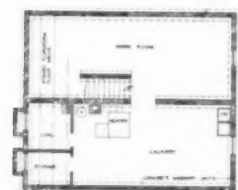
Construction Costs:

Cellar excavation.....	\$ 86.80
Cellar footings.....	79.93
Cellar walls, stairs, partitions, and floor.....	443.72
First and second Floroform floors.....	603.87
Chimney and fireplace.....	48.85
Walls, partitions, stairs.....	788.36
Steel sash, screens, painting.....	216.13
Cleaning, pointing, painting.....	206.76
Roof.....	382.65
Gutters and leaders, copper.....	46.50
Doors, trim, hardware.....	188.67
Plumbing (brass).....	379.07
Wiring and fixtures.....	175.20
Heating.....	353.70
Water connection.....	26.25
Septic tank and field.....	80.24
Electric range and wiring.....	100.90

Total cost.....\$4,207.60



GROUND FLOOR



BASEMENT

HOUSE OF G. CASS LIGHTNER

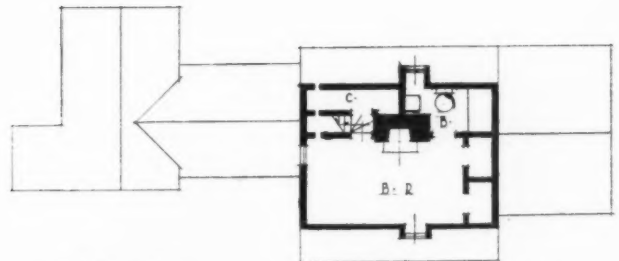
STAMFORD, CONNECTICUT



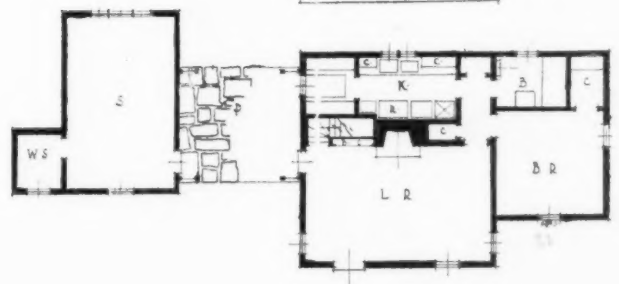
Photograph by Glasgow

COGGINS AND HEDLANDER
ARCHITECTS

SECOND FLOOR



FIRST FLOOR



Cost: \$4,700, complete.

"THE AMSTERDAM"

CHATHAM, NEW JERSEY



Photographs by Anderson

RANDOLPH EVANS, ARCHITECT

Concrete basement with concrete blocks in un-excavated portion. House frame is of wood with shingle facing; shingle roof. Interior walls are plastered; tile walls in bathrooms. Red oak floors; concrete floors in basement and garage. Insulation of Cabot's Quilt. There is an American Radiator boiler utilizing coal as fuel. Color scheme of the exterior: white walls, green roof and blinds. Double-hung sash of wood; screens, aluminum.

"THE GLEN"

CHATHAM, NEW JERSEY



RANDOLPH EVANS, ARCHITECT

Foundations, poured concrete and concrete blocks in unexcavated portion. Walls are wood frame with siding as facing. Cabot's Quilt flexible blanket type insulation applied to second floor ceiling. Heating is by steam with ABC oil burner. Wiring, BX cable. Color scheme of exterior is as follows: white walls, gray roof, gray-blue blinds. Sash are double-hung and of wood; screens, aluminum.



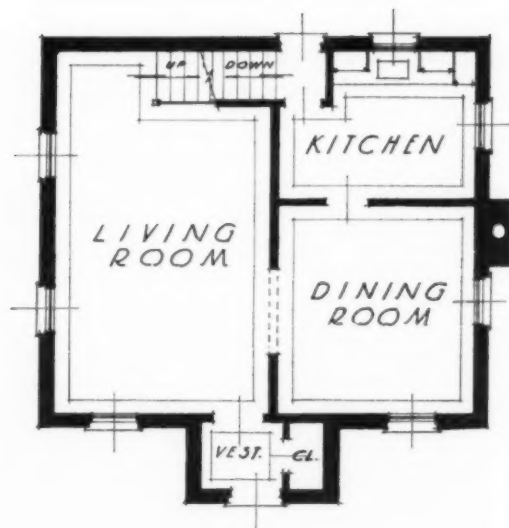
Photograph by Ewing Galloway

Two-Story, Six-Room Houses

Cost: \$4,940, including land

An operative-built development on Long Island by Gross-Morton Corporation, builders of Bayside Hills; Arthur E. Allen, architect. A practical demonstration of the possibility of building and selling a house and plot (40' x 100') for an amount within the \$5,000 limits of the study that appears in this issue.

Specifications: Slate roof, inlaid linoleum in kitchen, enamel-faced, insulated gas range with table top, kitchen cabinets with baked Duco finish, welded-on-steel drainboard with stainless steel bindings, built-in ironing board, tile bathroom, chromium-plated plumbing fittings, built-in colored bathroom fixtures, shower, steel medicine cabinet, brass plumbing throughout, jacketed steam boiler, porcelain laundry tubs, three coats plaster, copper leaders and gutters, 12" poured concrete foundation, double floors, 7/8" oak throughout, metal weatherstripping on all windows, reinforced concrete streets in and paid for, cement sidewalks and curbs in and paid for, fire-stop construction, city sewers.



FIRST FLOOR



Photographs by C. J. Dubrey

HOUSES WITH 40' x 100' PLOT PRICED AT \$4,940.



SECOND FLOOR

VIEW OF TYPICAL KITCHEN



LOCKWOOD DeFOREST GUEST HOUSE

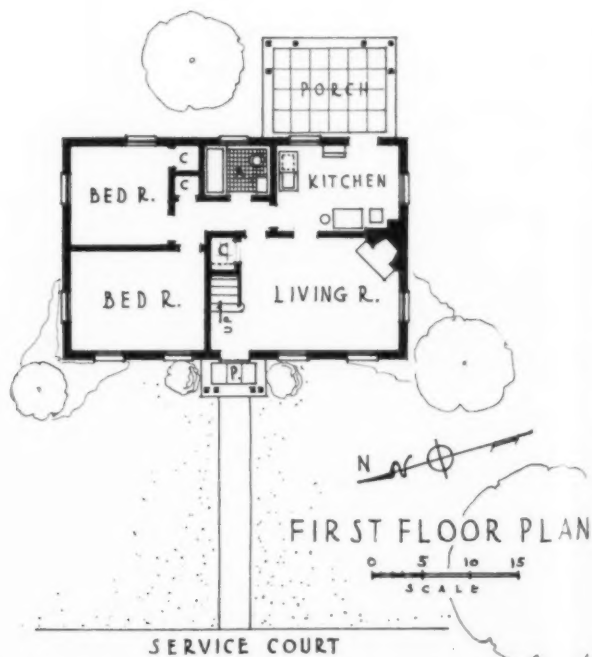


Photograph by Van Anda

COLD SPRING HARBOR, LONG ISLAND, N. Y.

W. STUART THOMPSON,
ARCHITECT

A small house built at $29\frac{1}{2}$ ¢ per cu. ft.
Materials and construction: Concrete foundations; brick veneer exterior walls; wood floor and roof construction; wood shingle roof; oak floors (linoleum in kitchen, tile in bathroom); plaster walls.



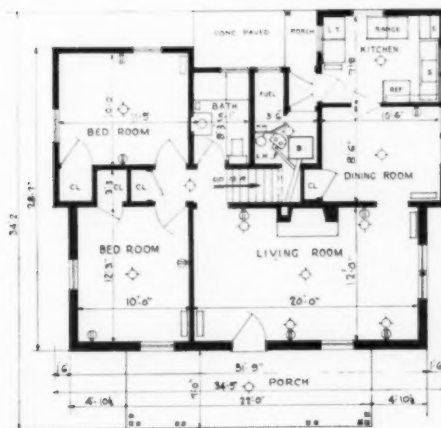
HOUSE FOR MR. & MRS. F. J. PLATT HYBLA VALLEY FARMS, VIRGINIA



Photograph by F. S. Lincoln

This house indicates the possibility of home construction under the FHA. The house is of brick-veneer construction, with unfinished attic space convertible into two extra bedrooms and bath. A sales price of \$5,500 includes improved lot and all mechanical equipment—furnace, hot water heater, electric range and refrigerator, sewage disposal system, drilled well with electric pump. Contractor's allowance and sales-promotional expense are included in sales price.

CARROLL F. MORRISON,
CONSULTING ENGINEER



NATIONAL LUMBER MANUFACTURERS' ASSOCIATION

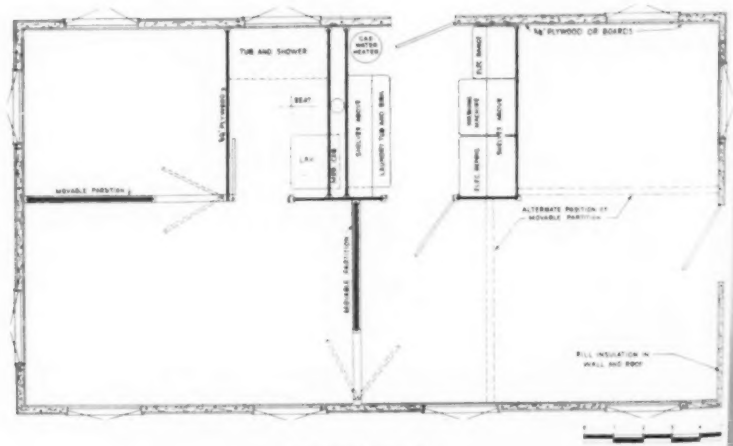


PORTABLE HOUSE: PLAN NO. 5

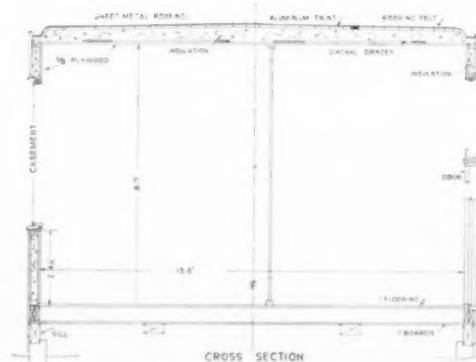
(Copyrighted)

An interesting partly prefabricated house of lumber products designed to accommodate two adults and one child. The size is such that it may be moved on a truck.

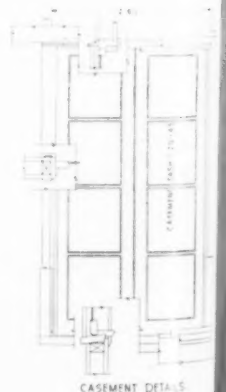
Construction: Foundations: two longitudinal stringers resting on concrete piers. Exterior walls: prefabricated units, board exterior, plywood interior finish, insulated core. Floors: hardwood in living and bedrooms, linoleum in kitchen and bathroom. Roof: sheet metal finish, insulated core. Porches are detachable. Cost, estimated for Washington, D. C., \$1,240; with electric range, washing machine and refrigerator, screens, flagged walk, landscaping, \$1,600.



FLOOR PLAN



CROSS SECTION



CASEMENT DETAILS

DWELLINGS FOR OWNER OCCUPANCY HOLD SPOTLIGHT

By L. SETH SCHNITMAN,

Chief Statistician, F. W. Dodge Corporation

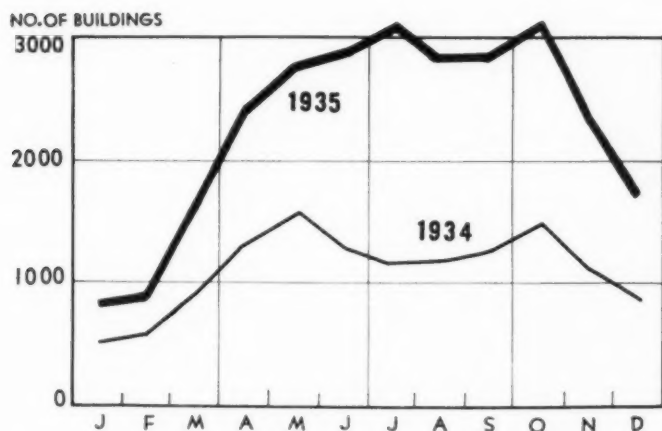


CHART 1. NUMBER OF NEW SINGLE-FAMILY DWELLINGS FOR OWNER OCCUPANCY.

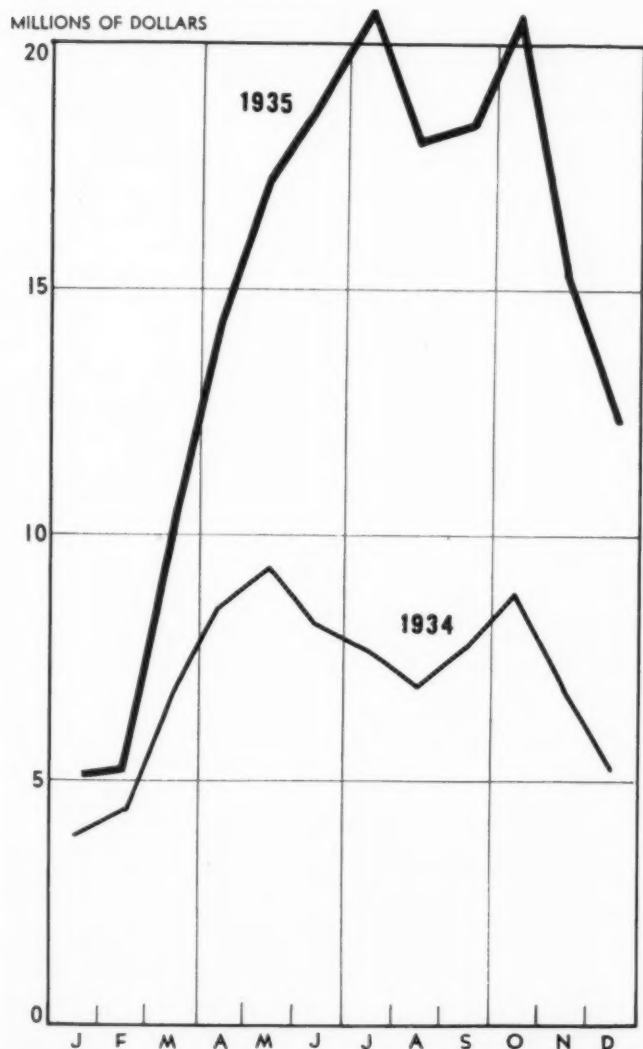


CHART 2. VALUATION OF NEW SINGLE-FAMILY DWELLINGS FOR OWNER OCCUPANCY. Besides showing direct comparisons for each month of 1935 with the corresponding month of 1934 this chart affords a useful index of the recent seasonal tendencies.

Residential building ended the year 1935 with a total of \$478,843,100 for the 37 eastern states. Besides being the largest annual total since that registered for 1931, the 1935 volume marked a gain of 92 per cent over the total for 1934.

Of the 1935 volume, \$176,720,900 represented new single-family dwellings erected by home-owners for their own occupancy. Thus it is seen that the single-family dwelling for owner occupancy accounted for about 37 per cent of total residential building operations, both new and alteration. The remainder included all of the speculative and investment types such as apartments, two-family houses, single-family dwellings for sale or rent and all residential alterations of every description.

During the first half of 1934 home owners undertook the erection of a total of 6,137 one-family dwellings in the aggregate value of \$41,028,300. During the final half of 1934 the volume increased to 7,017 in the amount of \$43,279,600. Thus it is seen that the totals for the final half of the year were about 114 per cent of the number and about 106 per cent of the value of the respective totals for the first half. The number of single-family dwellings undertaken by owners in the final half of 1935, however, was about 137 per cent of the total for the first half of the year while the aggregate value was almost 150 per cent of the value reported for the first six months of 1935.

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To state the recent improvement in still another way: (1) for the first half of 1935, the 11,538 owner-occupied dwellings undertaken in the 37 eastern states represented a gain of 88 per cent over the total for the first half of 1934; (2) the improvement in the aggregate value amounting to \$71,134,400 for the first half of 1935, was about 73 per cent; (3) for the final half of 1935, the 15,892 owner-occupied dwellings undertaken represented an increase of about 126 per cent over the number undertaken in the final half of 1934; and (4) the aggregate value of owner-occupied single-family dwellings during the latter half of 1935 was about 144 per cent heavier than for the final index of the recent seasonal tendencies.

Improving conditions may be expected to continue but there is little reason to believe that the large percentage gains recently in evidence can be maintained for any long period. Though increases, percentage-wise, may be more moderate, the actual increases in 1936 in number of single-family dwellings for owners' occupancy and in their aggregate value may possibly be as great as the quantitative gains in these items between 1934 and 1935. For 1935 the gain in units over 1934 totaled 14,376 while the improvement in value amounted to \$92,413,000 for the 37 eastern states. Should these gains be approximated for 1936 it would mean gains in excess of 50 per cent in both number and value as compared with the totals for 1935.

In Chart 3 is shown, for the 37 eastern states, the 1935 distribution of residential building operations by major types, together with comparisons for 1934. These items cover both new and alteration projects. From this standpoint the 1935 results were as follows:

1935 PERCENTAGE GAINS OVER 1934

Dwellings for Owners' Occupancy	87 per cent
Dwellings for Sale or Rent	106 per cent
Two-family houses	107 per cent
Development Projects	159 per cent
Apartments	134 per cent
Dormitories	13 per cent
Hotels	14 per cent

These gains were almost entirely due to gains in private building operations as against public housing undertakings. Improved mechanisms of mortgage finance, especially the insured mortgage plan of the FHA, have had their part but the demand factors for housing have probably had greater influence as a motivating cause for the improvement.

Early records for January 1936, indicate that the large percentages of gain over the preceding year reported in recent months are beginning to narrow. This is of relatively little moment. At this stage of the recovery cycle, quantitative gains will be more significant than percentages of improvement. It is of larger importance to note, too, that improvement is sustained in each of the major geographic areas. For the first half of January two districts, the Southeastern and St. Louis territories, failed to show residential contract totals as large as those reported for the corresponding period of 1935. This evidence is fragmentary, to be sure, but such conditions are worth watching for indications of possible tendencies. There is little doubt, at this writing, but that residential building totals for most of the major areas east of the Rockies during 1936 will exceed their respective totals for 1935.

RESIDENTIAL BUILDING CONTRACTS AWARDED 37 EASTERN STATES, January 1-January 15

	1936	1935
37 Eastern States, Total	\$16,224,500	\$10,659,600
New England States	1,143,500	661,200
Met. N. Y. & Vicinity	4,257,700	3,554,000
Upstate New York	196,600	64,500
Middle Atlantic States	1,864,000	1,001,100
Pittsburgh Territory	1,574,100	1,043,000
Southeastern Territory	1,735,700	1,961,400
Chicago Territory	1,223,400	306,900
Cent. Northwest Territory	205,200	38,700
So. Michigan Territory	872,900	322,500
St. Louis Territory	760,500	821,100
Kansas City Territory	1,124,600	207,100
New Orleans Territory	220,500	183,900
Texas	1,045,800	494,200

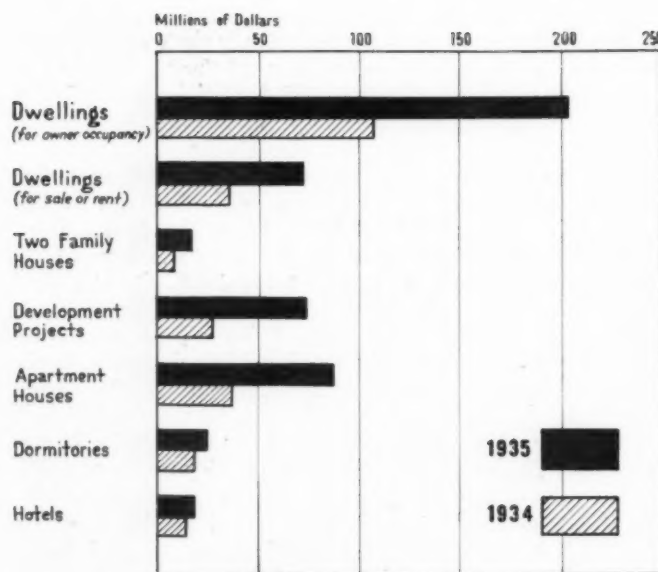
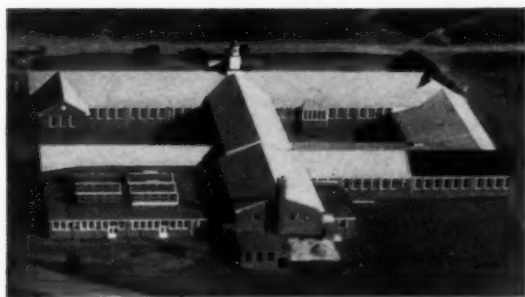


CHART 3. VALUATION OF RESIDENTIAL BUILDING OPERATIONS: 1934 AND 1935. This chart affords a distribution of the residential volume by significant types. Unlike the other charts in this article, this chart covers both new and alteration work.

● All charts in this article cover data for the 37 states east of the Rocky Mountains.

To make a building
modern from the
floor up specify
Sealex Linoleum



WHETHER the architect is drawing plans for a new school building or the modernization of an old one, he will find that Sealex Linoleum fully meets every requirement. No other type of floor-covering has the combination of features which makes Sealex first choice for these buildings.

Where quiet is so essential for studying, Sealex Linoleum is the ideal floor—its resilient surface helps muffle the noise of foot traffic. Moreover, a smooth, sanitary Sealex Floor is a great aid to cleanliness in gymnasium and playground areas.

The economy of Sealex Linoleum qualifies it for the most limited building budget. Quickly installed without costly preparation of the underfloor, it is also very inexpensive to maintain . . . and stands up under years of hard wear.

Your specifications for Sealex Linoleum will be faithfully carried out by authorized contractors of Bonded Floors. Such installations are backed by Guaranty Bonds covering the full value of materials and workmanship. Write for full information.

CONGOLEUM-NAIRN INC., KEARNY, NEW JERSEY

SEALEX TRADEMARK REGISTERED *Linoleum Floors and Wall-Covering*



Two more modern schools—in Knoxville, Tenn.,—have installed the modern floor for corridor requirements—Sealex Linoleum. The smooth, resilient surface of Sealex affords maximum quiet—and never needs refinishing.

NEW MATERIALS AND EQUIPMENT

NEW CATALOGS
RESEARCH REPORTS
MANUFACTURERS' LITERATURE

Architects are invited to use the coupon on this page as a convenient means of obtaining manufacturers' publications describing in detail the products and materials mentioned

B1

NU-WOOD FOR WALLS, CEILINGS

A new booklet issued by the Wood Conversion Company illustrates rooms in homes, churches, schools, theaters and other interiors finished in Nu-Wood. Made of clean wood fiber, this new wall and ceiling treatment consists of tile, plank and wainscot units, in large, easy-to-handle sheets which are said to insulate thermally and acoustically. Nu-Wood's several shapes and colors make a wide selection of patterns available. All manner of styles can be "matched."

B2

GENERAL BRONZE PANIC-PROOF DOORS

A new catalog by General Bronze Corp. describes an automatic device which in time of panic causes the leaves of its revolving doors to assume an open, folded position. Another feature is the possibility of fixing the rate of rotation to any desired speed. Elimination of noise, dust, drafts, is claimed by the manufacturer as primary advantages of General Bronze revolving doors which are available in bronze, aluminum, nickel silver, and wood.

B3

CEMENTOP SHINGLES ANNOUNCED

Full details on a new type of cement coated asphalt shingle are about to be released. These shingles, which will be known generically as cementop shingles, are the result of a special processing method developed by Bakelite Building Products Company. By the new process conventional asphalt shingles are given an extra surface coating of special formula hydraulic cement in which mineral oxide pigments are incorporated. This cement coating provides a vehicle for the incorporation of a variety of permanent colors which could not be had heretofore. These colors include white, blues, greens, grays, reds, and black. A white siding material, so long needed, is now available. Of snow white, heat-reflecting cement, it makes an ideal siding for the Colonial type house. The cement coating also gives the shingles rigidity. It acts as a shield protecting the asphalt beneath from the rays of the sun. It is said to seal the asphalt so effectively that tropical heat will not bake out the oils and other volatile elements present in asphalt shingles. These shingles also have better fire resistance, greater resistance to erosion, and greater insulation value, according to an advance release.

AN OFFER TO ARCHITECTS PRACTICING IN UNITED STATES

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about any products mentioned, write the index numbers in space below. For literature about products advertised in this issue, give name of the product and manufacturer. Return coupon to The Architectural Record, 119 West 40th Street, New York, N. Y.

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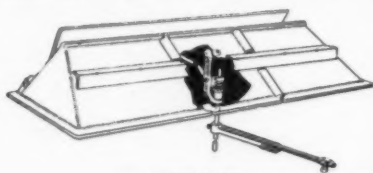
STREET ADDRESS

CITY AND STATE

COLONIAL DAMPER

Standard With Architects—Has No "Equal"

The fireplace—"heart of the home"—is important in the owners' enjoyment of his finished home far beyond its relative cost. Wise architects, therefore, specify and insist upon Colonial Dampers because they insure successful fireplaces.



"STYLE G"

Fireplace Problems Solved

For many years a growing number of leading architects have written us freely regarding their fireplace problems. We have successfully encountered through one-third century all the difficulties presented by different types and conditions of fireplace construction. Consult us freely.

COLONIAL FIREPLACE CO.

4622 ROOSEVELT ROAD

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BRONZE

for enduring beauty



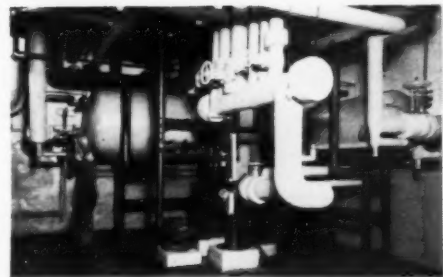
Edward S. Sibbert, *Architect*

IN THE new S. H. Kress & Co. store on Fifth Avenue and 39th Street, New York City, each window was designed as an attractive, refined and unobtrusive frame for the display of merchandise. Each window is of bronze . . . Anaconda Architectural Bronze in extruded shapes.

From the standpoint of lower original cost through the use of standard shapes which short cut die costs, Anaconda Extruded Bronze offers almost endless possibilities for the faithful execution of even the most original designs. Thousands of *standard* extruded shapes may be had in Architectural Bronze and Nickel Silver, while Copper and various Copper alloys are available in a wide range of standard *drawn* shapes. These various metals offer interesting possibilities wherever contrast or close color harmony is desired.

THE AMERICAN BRASS COMPANY

General Offices: Waterbury, Connecticut
Offices and Agencies in Principal Cities



DURABILITY IN WATER HEATERS, TOO

These two storage water heaters in the sub-basement of the Kress Building were fabricated of durable, *rustless* Everdur Metal, by the Sims Company, Erie, Pa. Nearly all copper, Everdur is a non-rust alloy which provides the strength of medium carbon steel. Readily welded by all commonly-used methods, this Anaconda Metal fulfills *all* the requirements for rustless storage heaters.



ANACONDA COPPER & BRASS

B4**REYNOLDS CORPORATION**

For suspended ceilings, tie-on partitions, and all other types of tie-on work, the Reynolds Corporation has developed a new type of rein-



forcing lath, called Reynolds Slotted Ecod Fabric. It is said to conserve on materials and installation time. The new lath is slotted at regular intervals to permit tying on to ceilings under steel joists, flat slabs, arches or concrete joists. According to the manufacturer the new slotted Ecod fabric is particularly adaptable to office remodeling work, for non-permanent partitions, and for all types of suspended ceilings.

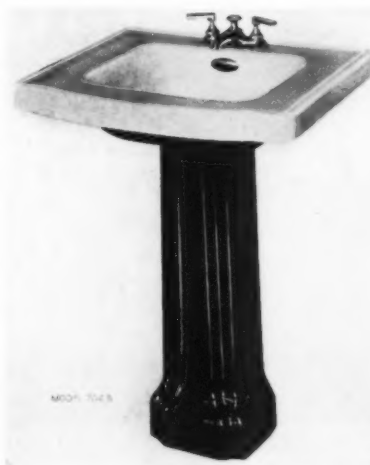
B5**"COMFORT IS IN THE AIR"**

An illustrated booklet released by The Bryant Heater Company reviews the fundamentals of air conditioning for the home and briefly describes the wide range of Bryant air conditioning equipment which uses gas as the all-purpose fuel. This manufacturer is said to offer suitable equipment to provide for

any or all of the factors of complete air conditioning. Among the Bryant units described in the booklet "Comfort in the Air," are (1) Bryant humidifier, (2) boiler, (3) Dualator.

B6**NEW LAVATORY BY BRIGGS**

The new Briggs pedestal permits the use of group or individual fixtures. It is easy to install as there is only one nut to adjust. The lavatory, which is 24 by 20 inches, is available in a variety of colors and color combinations. It is equipped with an easily removable overflow pipe for cleaning and has a wide



ledge all around which provides ample space for the convenient use of toilet articles. Both the lavatory and pedestal are finished in acid-resisting porcelain that is easy to keep clean.

B7**THE "RUBBER ROOM" COCKTAIL LOUNGE**

The varied applications of rubber are demonstrated in a new cocktail lounge of the Portage Hotel, Akron, Ohio. All doors are rubber cov-



ered, the floors are of rubber tile; chairs, stools and settees are all upholstered and covered with rubber materials; wainscoting and mural decorations are constructed entirely of rubber; drinks are mixed at a rubber bar and served on rubber-topped tables. Wall decorations consist of five murals, done completely in rubber. With Goodrich rubber tile a colorful floor design has been obtained by inlaying a series of figures which represent various products of the rubber industry. The settees, chairs and bar stools are upholstered with Nukraft—a new Goodrich product consisting of a hair cloth, insulated with Latex. The Nukraft is in turn covered with a rubber fabric resembling brown suede, which was supplied by the Hood Rubber Company. Further description given on request.

OUT OF SIGHT

Hidden within the walls and between the floors and ceilings, space is saved and tear-ups and replacements are unnecessary, if it's

DURIRON

ACID PROOF

DRAIN PIPE

THE DURIRON COMPANY, Inc.

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DAYTON, OHIO

See Our Catalog in Sweet's

AFTER 25 YEARS - THE VERDICT

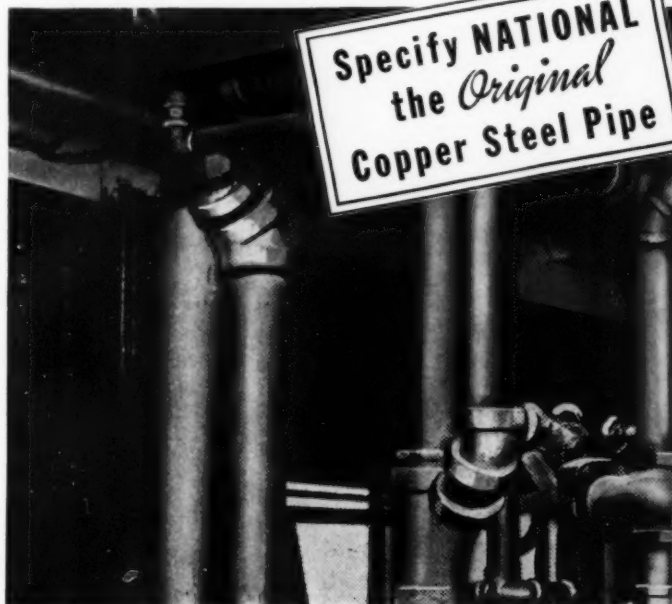
"This Pipe stays Put!"

ARCHITECTS, engineers, and builders, who years ago installed this—the original copper-steel pipe—today turn to NATIONAL Copper-Steel Pipe as a matter of course . . . and rightly so. The present excellent condition of these old pipe lines, the trouble-free service they have given, amply justify their choice.

For all types of buildings—in the soil, vent and waste lines, rain leaders and steam returns—wherever alternate wet and dry conditions induce corrosion—NATIONAL Copper-Steel Pipe provides simple and economical protection.

Costing only a few dollars more per ton than regular steel pipe, it will last two or three times as long. Over twenty-five years of tests and actual service records prove this.

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NATIONAL TUBE COMPANY
Pittsburgh, Pa.



Pacific Coast Distributors: Columbia Steel Company, San Francisco, Cal. *Export Distributors:* United States Steel Products Co., New York.



**"RESISTS CORROSION
IN VENT, WASTE, SOIL
LINES AND RAIN
LEADERS"**

Along with unusual corrosion resistance, NATIONAL Copper-Steel Pipe has the high strength, uniformity, ductility and other working qualities for which NATIONAL Copper-Steel Pipe is noted. Its easy installation is an important factor in speeding up construction.

For prompt identification every length of NATIONAL Copper-Steel Pipe is colored green in the smaller sizes; has two green stripes running lengthwise in the larger diameters. A copy of Bulletin No. 11 should be in your files.



NATIONAL TUBE COMPANY, Pittsburgh, Pa.

Gentlemen: Please send me copy of Bulletin No. 11 describing NATIONAL Copper-Steel Pipe.

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Company

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A Corporation serving the finest architects and contractors of the Metropolitan District, with offices established for twenty years in the Architect's Building, desires to absorb the present New York office that a non local manufacturer presently maintains at disproportionate expense.

Only one representation will be considered, in order to conscientiously do your material justice.

Financial responsibility is attested by an unbroken discount record since the inception of our business.

All correspondence will be held in strictest confidence.

Address Box 18

THE ARCHITECTURAL RECORD, 119 WEST 40th STREET
NEW YORK, N. Y.

B8

A NEW FRAMELESS WINDOW SCREEN

An all-bronze screen that is frameless, requiring neither painting nor repairing, is produced by the Cincinnati Fly Screen Co. Installation is said to be simple and quick and does not require an expert workman. Two screws are driven into the window frame at the top; the top rail of the screen is placed over them and, by a special integral device, locked in position. In the same way the bottom rail of the screen is made secure at the bottom of the window frame. Installed and removed from the inside, the screen is said to simplify cleaning and storage. Zip-In is the name given to the new screen.

B9

NEW ADJUSTABLE SASH BALANCE

A new adjustable sash balance, announced by the Pullman Mfg. Corporation is said to insure perfect and permanent window operation. It is installed without removing the sash or balance. Any necessary adjustment can be made as occasion requires

with an ordinary screw driver after sash balance has been installed in the window. The new adjustable balance permits the same economies which the non-adjustable type of Pullman balance has already demonstrated. It eliminates the noise and annoyance of sash cords, chains and weights. Its use allows narrower mullions, does away with boxed casings and obtains the maximum light area per window opening with narrower trim at jambs and heads if so desired. Since each size of the new balance can be adjusted over a minimum range of from 2 to 4 pounds, the contractor's problems are simplified. Installation can be accomplished in ten to fifteen minutes. The new adjustable balance is light in weight, being of all pressed steel construction, non-breakable and entirely encased so that no foreign matter can penetrate inside the housing and interfere with the free action of the moving parts. It is designed for use on wood, Kalamein, steel, bronze and aluminum sash. Further details will be supplied on request.

B10

AN IMPROVED INCINERATOR

A new line of incinerators is announced by the Kerner Incinerator Company. Using a new application of an old principle, that of supplying an extra volume of oxygen for primary combustion, the new models are said to be especially efficient. By means of an "air box" attached to the inside of the fire door, jets of air are made to impinge on the material on the grates, accelerating primary combustion, and another set of air jets, placed above the others, supply air to the gases, thus completing the secondary combustion. With the air torch principle, Kernerator is said to provide improved burning effectiveness, simplified masonry construction, space economy, and lower cost. A folder, just released by the manufacturer, illustrates the operating methods of the new design.



MINWAX Color Card

The following colors are supplied BOTH in Minwax Quick Drying Flat Finish and in Minwax Quick Drying Flat Finish. The colors are in transparent coats and are especially recommended for floors. All shades are shown here on a wood. All shades are shown here on a wood.

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Kindly forward to me copy of your special Architect's Minwax Color Card.

Name.....
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SEVEN YEARS OF FOOT TRAFFIC on Radburn, New Jersey, Floors

The hardest tests wood floors get are from rented tenants. And 7 years after Radburn specified Minwax they write us: "Not only has the finish been entirely satisfactory in its original form, but it has eliminated the necessity for re-scrapping."

The greatest endorsement of Minwax has come from the actual users.



Send for the MINWAX color cards. 12 colors on actual little pieces of wood, which shows correct reproduction.

THE MINWAX COMPANY
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B11

NEW PLASTER BASE INSULATION INTRODUCED BY MILCOR STEEL

"Milcor-Silvercote," a new product announced by the Milcor Steel Company, consists of a corrosion-proof, reflective insulation combined with Milcor metal lath. The reflective principle of insulation is embodied in the Silvercote backing which turns back from 80% to 95% of the radiant heat which strikes it. The surface of Silvercote consists of a mineral, homogeneous pigment polished to a silver-like sheen. Inasmuch as the surface of Silvercote is mineral, it cannot oxidize or corrode. The metal lath which functions as the plaster base for the new product is heavily galvanized in order to insure permanence and durability. A booklet, describing Milcor-Silvercote, is available upon request.

B12

NEW INDUSTRIAL AIR CONDITIONING UNITS

A new line of industrial air conditioner units, designed to meet a wide range of industrial air-cooling requirements with maximum cooling effect and low operating costs, is announced by the York Ice Machinery Corporation, York, Pa. The new models can be installed in any industrial plant, with or without distributing ducts. They are designed to insure uniform and continuous distribution of air at correct temperature and humidity for specific industrial needs. Furnished in either the high or low-pressure type, the York automatic float control is said to permit accurate and automatic control of the refrigerant, whether ammonia, circulating brine or cold water is used. The new conditioners are built in a sufficiently wide range of sizes to meet every requirement of capacity and temperature. Descriptive literature will be sent on request.

B13

CEDARGRAIN ASBESTOS SHINGLES ANNOUNCED BY JOHNS-MANVILLE

Johns-Manville announces cedar-grain asbestos shingles designed for use as siding for houses. They are made from asbestos fibers and portland cement and are said to be fireproof, permanent and free from upkeep expense. In this product, Johns-Manville claims to have captured the charm of weathered cedar shingles into which has been built the durability of stone. Their silvery-gray color is attractive and lasting. They do not require paint or other preservative and are equally adaptable for either new or existing structures. The cost of putting them on is low because the large units are applied easily and quickly. This new product comes in three designs including tapered or uniform thickness shingles with either wavy or staggered butts and a uniform thickness type with even butts. A descriptive brochure will be supplied to interested architects.



RESIDENCE AT GREAT NECK, LONG ISLAND, N. Y.
ARTHUR W. COOTE, ARCHITECT • JULES ROSENTHAL, CONTRACTOR

Whether for the traditional or the modern styles of house design, Fenestra Steel Casements offer the architect the choice of some 100 economical, standard types and sizes. Fenestra Bronze-Mesh Screens, Fenestra Steel Inside Casings, and the new Fenestra Insulating Window (for air-conditioning requirements) make the Fenestra Casement a complete, all-year window. Write for complete data. Detroit Steel Products Co., 2255 East Grand Boulevard, Detroit, Michigan.

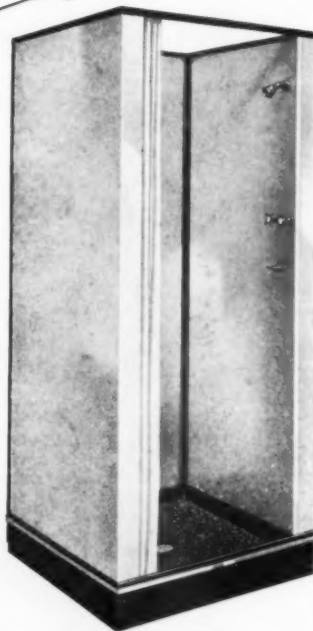
Fenestra

AN EXTRA BATH 3 FEET SQUARE



WEISWAY Cabinet Showers now make possible the luxury of an added bath—of gleaming vitreous porcelain enamel—in space no larger than an ordinary closet! There are models suited to the requirements of the finest home—and to easily fit the budget for the simplest cottage.

Here is the answer to the insistent demand of every modern family for extra bathing facilities. Space-saving, durable, beautiful, Weis Cabinet Showers are practical for new homes of every size, as well as in modernizing.

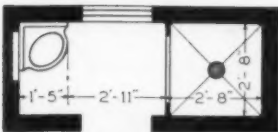


Safe

FOOT-GRIP, NO-SLIP FLOOR

One-piece vitreous porcelain enameled receptor has floor with new exclusive finish which positively prevents slipping. (Patents pending). Equally effective wet or dry!

Newest Weisway showers have walls of vitreous porcelain enamel. Other models in synthetic enamel. Built as complete units in themselves, Weisway Cabinet Showers are not affected by any settling of the building. Construction is guaranteed leakproof. They add far more in sales value to the property than their small cost, besides providing an immeasurable extra comfort and convenience in use!



Write now for detailed specifications and prices. Complete Weisway line includes models for homes of every size as well as for hotels, schools and institutions of every type.

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ESTABLISHED 1876
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Cabinet WEISWAY Showers

B14

PROTECTIVE FEATURES OF ROLLING GRILLE

Without the sacrifice of air, light or vision, the Kinnear rolling grille provides safeguard against trespassing, burglary and kidnapping. Permanently installed and counter-balanced it can easily be raised or lowered. When closed, it can be securely locked. With electrical mechanism special automatic operation and control can be furnished. Coiling in a small amount of space above the lintel, the entire equipment occupies no otherwise useful space. Built of various metals, the rolling grille is said to be attractive and in harmony with any style of architecture. Descriptive literature is offered by the Kinnear Manufacturing Company.

B15

NEW CATALOG ON BOILER BURNER UNIT

The Oil Heating Division of National Radiator Company has released a new general catalog on the National-Williams Oil-O-Matic Boiler Burner Unit. Completely self-contained, small and compact, beautiful in its proportions and finish, the unit is said to combine "utility and beauty in a degree hitherto unrealized."

TRADE ANNOUNCEMENTS

JOHN LUCAS & COMPANY, INC.

John Lucas & Company, Inc., paint manufacturers, recently announced the Lucas Paint Finance Plan, made possible by the National Housing Act. No down payments are required. Payments may be financed up to 18 months, with the first monthly payment due one month from date of completion. Interest rates are low, the same as those of the National Housing Act.

FITZGIBBONS BOILER COMPANY, INC., COMPLETES FIFTY YEARS

In 1936 the Fitzgibbons Boiler Company, Inc., of Oswego, N. Y., completes a half-century in the manufacture and development of steel boilers exclusively. It is pointed out that the steel boiler for residential heating which has come into such prominence during the past few years, was pioneered by Fitzgibbons. Early in its career the Company turned its attention to the development of stationary boilers embodying the salient features of marine construction with its accompanying operating efficiency. First efforts were directed to the larger boilers for power plant and central heating establishments. The development of highly efficient small heating boilers soon followed, patterned along the proven lines of the large boilers. Today the Fitzgibbons plant is complete in every respect, including its own foundry. Equipment and capacity are ample for the manufacture in quantity of the wide range of types and sizes which now constitute the Fitzgibbons line of steel heating and power boilers.